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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE PRESERVATION OF MANURE.

From the London Farmers' Magazine.

Sir,—You will be aware that the objects of manure are to restore to the soil those substances necessary to the growth of plants, which are removed in the *crops*. Though this perhaps is not the only point to be considered when treating on *manures*, it is evidently one of the utmost importance. The mechanical influence of the soils is no doubt great, but its consideration peculiarly belongs to the cultivator. In the present letter, I shall endeavor to draw your attention to those manures which are calculated to increase the nutritious properties of the cereal grains, and those grasses which are the indirect means of giving food to man.

The substances removed by crops from the soil must be restored; some plants remove one class of salts, some another; but all those which are fitted to the support of animal life take from the soil the *nitrogen* contained in it. For all plants cultivated for the use of man contain *nitrogen*, and in proportion to the quantity of this element so are the nutritious qualities of the food. The nutritious parts of wheat and all grain are in fact exactly of the same composition as flesh and blood. The following is a statement of the numbers:

	In gluten, the nutritious part of wheat.	*In blood.*
Carbon, - - -	54.603	54,56
Hydrogen, - - -	7.302	6.90
Nitrogen, - - -	15.59	15,72
Oxygen, sulphur, phosphorus,	22.286	22.82*

This shows that nitrogen is a very important constituent in the food of man.

To ill preservation in manure I shall now take the liberty of calling your attention.

Nitrogen is supplied to plants in a wild state from the atmosphere † —in a cultivated state from the soil and atmosphere. In manuring lands then we return to them the nitrogen which has been taken from them in the crops, and we always return it to them in the form of some compound of ammonia. The goodness of manure, or its fitness to restore the nitrogen to the soil, consists in the quantity of ammonia, which is composed of nitrogen and hydrogen, including those substances containing nitrogen which sooner or later will be converted into ammonia or hartshorn by the putrefactive process.

Let us now consider the state of a heap of manure, consisting of animal excrements, liquid and solid, which contain large quantities of nitrogen in the form of ammonia; let us consider, I say, this heap of manure lying exposed to the influence of the weather during a hot summer. The nitrogenized parts are gradually converted into ammonia, and the greater part of this ammonia is volatilized and carried into the atmosphere. We cannot have failed to remark the smell of this body when passing by a heap of manure in a hot day, even though we be at a considerable distance from the spot where the manure is deposited; to taint so large a quantity of air with its smell, would require a large quantity of ammonia; and what passes into the atmosphere is comparatively lost to the agriculturist, or it does him no more good than his neighbors, for it is carried down by the rain and spread equally over the country.

Ammonia or hartshorn possesses the properties in common with all alkalies of uniting with acids, and forming with them in most cases compounds of sparing volatility. All aluminous minerals and those containing *peroxide* of iron possess also the power of condensing the volatile alkali in such a manner that it is not carried away and lost by every gust of wind that passes over the dunghill. Alumina and peroxide of iron are in fact very nearly allied, and possess the property of combining with ammonia in common, one being isomeric with the other. Ammonia, *the active part* of manures, may be rendered fixed, it has been said, by *acids*, and you will allow me to point out the practicability of this plan in the first instance. In *urine* that has undergone putrefaction, ammonia exists as carbonate, phosphate, lactate, &c.; the first of these salts is continually evaporating, and ammonia is set free from all the other salts by adding lime, which is a practice too common. Let us now suppose a manure consisting of these salts mixed with organic matter, to be watered with a weak solution of sulphuric acid (oil of vitriol); the salts of ammonia are decomposed and a sulphate formed—this sulphate is quite fixed. The composition of this sulphate of ammonia is *per cent.* ammonia 39.48, sulphuric acid 60.52. For every 60 pounds of sulphuric acid employed (and it costs but a penny a pound), 39.48 pounds of ammonia are fixed in the manure, and may be kept for any period of time without loss.

We shall see the advantage of this method of proceeding by following the annexed calculation: —100 pounds of hay contain one pound of nitrogen, and every hundred parts of ammonia contain 82.54 *per cent.* of the same element. For every hundred pounds, then, of ammonia, conveyed to the soil in this manner, there will be produced, supposing all the nitrogen to be assimilated in the proportion to form hay, 82,000 pounds of hay.

Calculating the advantages at a much less rate than the above, the profit in nitrogenized parts that will be produced will amply repay the agriculturist for the trifling outlay in sulphuric acid. Indeed, no opportunity of preserving the ammonia produced by animals should be neglected; a few pounds of sulphuric acid being mixed in a diluted state with the manure would be of immense advantage. Throwing down sulphuric acid in all places where excrementitious matter collects, would be a never failing source of nitrogen, containing manure laid up in a safe form ready for use. The absurd practice of using lime for removing those smells caused by ammonia cannot be too much deprecated, as lime immediately set

* Annalen der Chemie und Pharmacie, xxxix. 149.
† Liebig, Agr. Chem.

free all the ammonia which the manure contains, and it is lost.

The manure preserved by sulphuric acid should be thrown in the soil with gypsum, and would be a never failing source of nitrogen. The same good results will arise, though in a less degree, from the use of burnt clay and other aluminous minerals; but from their property of forming insoluble compounds with ammonia, and uniting with no other bases, they are more adapted to the immediate application to the soil, than for being mixed with manure. Another advantage which sulphuric acid possesses is, that it converts all the lime that may happen to be in the soil into gypsum, which is a sulphate of lime.

T. G. T. Ph. D.

ON THE COMPARATIVE FEEDING PROPERTIES OF MANGEL-WURZEL AND SWEDISH TURNIPS.

By the Right Hon. Earl Spencer.

From the Journal of the Royal Agricultural Society of England.

My dear sir,—You expressed a wish that I should again publish the results of an experiment which I made fifteen or sixteen years ago on the comparative feeding properties of Swedish turnips and mangel-wurzel. It was published in the 'Farmer's Journal' of that day, but I believe it is now very little if at all remembered; and I agree with you in thinking that it may be more interesting now, when men's minds are more turned to this sort of investigations.

The mode of ascertaining the nutritious properties of different kinds of vegetable food by chemical analysis, which was adopted by Sinclair and other scientific men, gives a reasonable probability of their relative value; but we know so little of the processes of nature in converting food into the flesh of the animal that consumes it, that this mode has never appeared to me quite satisfactory. Although, therefore, I believed that mangel-wurzel contained more saccharine matter than Swedish turnips, and ought consequently to be the more nourishing root of the two, I determined to try practically whether an ox fed upon mangel-wurzel increased in weight more than one fed upon Swedish turnips, in proportion to the quantity of each consumed. In order to have rendered my experiment perfectly accurate, I ought to have ascertained the weight of hay consumed by each beast during the progress of the trial, but I did not do this, although I am pretty confident that the quantity consumed by each was nearly the same. I selected two steers, tolerably and at least equally well-bred: No. 1, calved March 29, 1823, and No. 2, calved May 6 of the same year; and on the 24th of December, 1825, I put No. 1 to Swedish turnips, and No. 2 to mangel-wurzel. I ascertained their weight by measurement, and both of them measured the same, viz. 4 ft. 10 in. in length by 6 ft. 5 in. in girth, making them to weigh 668 lbs. each. On the 23d of January, No. 1 had consumed 1624 lbs. of Swedish turnips, and measured 4 ft. 10 in. in length by 6 ft. 7 in. in girth, making him to weigh 703 lbs., and to have increased in weight 35 lbs., or at the rate of 48¼ lbs. for every ton of Swedish turnips consumed. No. 2 had consumed 1848 lbs. of mangel-wurzel, and measured 4 ft. 10 in. in length by 6 ft. 8 in. in girth, making him to weigh 721 lbs., and to have increased in weight 53 lbs., or at the rate of 65½ lbs. for every ton of mangel-wurzel consumed.

This difference, however, might have arisen from No. 2 having a greater propensity to feed than No. 1; I therefore now put No. 1 to mangel-wurzel, and No. 2 to Swedish turnips. On the 20th of February, No. 1 had consumed 1884 lbs. of mangel-wurzel, and measured 4 ft. 11 in. in length by 6 ft. 8 in. in girth, making him to weigh 734 lbs., and to have increased in weight this month 31 lbs., or at the rate of 36¾ lbs. for every ton of mangel-wurzel consumed. No. 2 had consumed 1880 lbs. of Swedish turnips, and measured 4 ft. 11 in. in length by 6 ft. 8 in. in girth, making him to weigh also 734 lbs., and to have increased in weight during this month 13 lbs., or at the rate of 15½ lbs. for every ton of Swedish turnips consumed. I then put both to mangel-wurzel, and divided the food equally between them. On the 19th of March, they had each consumed 1792 lbs. of mangel-wurzel; No. 1 measured 5 ft. in length by 6 ft. 10 in. in girth, making him to weigh 784 lbs., and to have increased in weight 50 lbs.; No. 2 measured 5 ft. in length by 6 ft. 9 in. in girth, making him to weigh 765 lbs., and to have increased in weight 31 lbs.

It would appear, therefore, as if the propensity to feed of No. 1 was greater than that of No. 2 in the proportion of 50 to 31; but notwithstanding this, in the first month, when No. 1 was upon Swedish turnips, and No. 2 upon mangel-wurzel, No. 2 beat No. 1 in the proportion above stated of 65½ to 48¼. It appears as if there could be no great inaccuracy in estimating the relative weight of the animals, as soon after the experiment was concluded I sold No. 1 to a butcher in the country for 24*l*. 3*s*., and No. 2 at Smithfield for 24*l*.

It will be for practical men to decide upon the value of this trial; what appears to me to be the most conclusive part of it is, that No. 2, who had during the first month, when he was feeding upon mangel-wurzel, increased in girth 3 in., in the next month, when his food was changed to Swedish turnips, did not increase in girth at all, and when in the third month he was feeding again upon mangel-wurzel he again began to increase in girth, because it is very well known that, if an animal is changed from more to less nutritious food, the probable consequence will be that his growth will be stopped. The results appeared to me so decisive, that I have not tried the experiment with the same accuracy since; but I did try the following year the feeding a cow alternately on Swedish turnips and mangel-wurzel, and though I have not by me the details of the trial, I remember that the result confirmed the experiment of the previous year. Believe me, my dear sir, yours most truly, SPENCER.

Philip Pusey, Esq. M. P.

WORM IN THE KIDNEY OF SWINE.

From the Democratic (Me.) Clarion.

Mr. Editor:—I am induced to send you the following statement, not so much from the importance

of this particular case, as from its being a link in the great chain of testimony in favor of a more humane and improved treatment of diseased swine.

In Oct. last, I observed that a thrifty young shoat of mine was weak in the back: he grew worse for several days, until he could scarcely move about, or even get up. At this stage of disease, I commenced feeding him with corn, boiled soft in strong lie, with the addition of a handful of charcoal. This feed was continued four or five days, at which time the hog had to all appearances become as well as ever, and so continues to this time.

J. D. HILL.

No. 3d Range, near Bingham.

OF THE PRESERVATION OF RACES BY SEED.

From Lindley's Horticulture.

The manner of preserving the domesticated races of plants by the ordinary means of propagation, such as cuttings, layers, grafts, and so on, has already been explained; there are, however, some other topics connected with this important subject which require to be touched upon.

Propagation by division is inapplicable to annuals or biennials, or at least can be practised upon only a very limited scale, and for such plants the gardener has to trust to seeds alone. But it is an axiom in vegetable physiology that seeds reproduce the species only, while buds (that is, propagation by division) will multiply the variety; and this is undoubedly true as a general rule. But the skill and care of the gardener often enable him to perpetuate by seed the many races of cultivated annuals, varieties of the same species, improved and altered by centuries of domestication, with as much certainty as if he were operating with cuttings. In a well managed farm we see the various breeds of turnips and corn preserving each its own peculiar character unchanged year after year, and yet they must all be propagated by seed alone; and in gardens the varieties are innumerable of peas, lettuces, cabbages, radishes, &c., whose purity is maintained by the same means. The manner in which this is effected is of the first importance to be understood.

Although it is the general nature of a seed to perpetuate the species only to which it belongs, and it cannot therefore be relied upon, in ordinary cases, to renew a particular variety of the species, yet there is always a visible tendency in it to produce a seedling more like its parent than any other form of the species. Suppose, for example, the seed of a Ribston pippin apple were sown; if untainted by intermixture with other varieties, it would produce an apple tree whose fruit would be large, sweet, and agreeable to eat, and not small, sour, and uneatable, like the wilding apple or crab. The object of the gardener is to fix this tendency, and he does it by means not unlike those employed in the preservation of the races of domesticated animals, namely, by "breeding in and in," as the phrase is. An example of this will be more instructive than a dissertation. The radish has, when wild, a long pallid root; among many seedlings one was remarked with roots shorter and rounder, and more succulent than the remainder; this was a "sport" to which all plants are subject. Had that radish been left among its companions, and the seed saved from them all indifferently, the tendency would have disappeared for that time; but its companions were all eradicated, and the better one produced its seed in solitude. The crop of young plants obtained from this radish was, for the most part, composed of individuals of the wild form, but several preserved the same qualities as the parent, and some, perhaps one only, in a higher degree: in this one, then, the tendency was beginning to fix. Again were all eradicated, except the last-mentioned individual, whose seeds were carefully preserved for the succeeding crop; and, by a constant repetition of this practice for many years, at last the habit to produce a round and succulent root became so fixed, that all the radishes assumed the same appearance and quality, and there were none left to draft or "rogue." Every variety of annual crop, not still in its wild state, must have gone through this process of fixing; and thus the varieties of earliness, lateness, and productiveness, color, form, and flavor, observable in garden plants, have been secured for our enjoyment.

But to fix a new habit in annual plants is not the only care of the cultivator, whose patience and skill would be ill employed if it could not be preserved. If a plant has some tendency to vary from its original condition, it has much more to revert to its wild state; and there can be no doubt that, if the arts of cultivation were abandoned for only a very few years, all the annual varieties of our gardens would disappear, and be replaced by a few original wild forms.

For the means of preserving the races of plants pure, the means vary according to the nature of the variety. As far as concerns early and late varieties, it often happens that, as in peas, the tendency in such plants to advance or retard their season of ripening was originally connected with the soil or climate in which they grew. A plant which for years is cultivated in a warm dry soil, where it ripens in forty days, will acquire habits of great excitability; and, when sown in another soil, will, for a season or so, retain its habit of rapid maturity: and the reverse will happen to an annual from a cold wet soil. But, as the latter will gradually become excitable and precocious, if sown for a succession of seasons in a dry warm soil, so will the former lose those habits and become late and less excitable. Hence, the best seedsmen always take care that their early varieties of annuals are procured from warmer and drier lands than those on which they are to be sown; our earliest peas, for example, are obtained from France, and the next in time of ripening from the hot dry fields of Kent, the Suffolk coast, and similar situations. Thus, also, the barley grown on sandy soils, in the warmest parts of England, is always found by the Scotch farmer, when introduced into his country, to ripen on his cold hills earlier than his crops of the same kind do, when he uses the seeds of plants which have passed through several successive generations in his colder climate; and Mr. Knight found that the crops of wheat on some very high and cold ground, which he cultivated, ripened much earlier when he obtained his seed-corn from a very warm district and gravelly soil, which lies a few miles distant, than when he employed the seed of his vi-

cinity. It would seem as if this were in some way connected with the mere size of a seed, the smallest seeds of a given variety producing plants capable of fructifying quicker than those of a much larger size. We have, at present, but little information upon this subject; but there are some most curious experiments relative to it by Messrs. Edwards and Colin, who found that, although winter wheat cannot, in France, be made to shoot into ear, if sown in the spring, provided the largest grains of the variety are employed, yet that, if the smallest grains are picked out, some will ear like spring wheat (see *Annales des Sciences Naturales*, v. 1.) Out of 530 grains of winter wheat, sown on the 23d of April, and weighing 7 ounces 52 grains, not one pushed into ear, they tillered abundantly, but the tillers were excessively stunted, and concealed among the tufts of leaves; in short, they formed nothing but turf: on the other hand, of 530 other grains, weighing 3 ounces 56 grains, and sown on the same day, 60 pushed in ear.

It would seem as if many of our most esteemed garden plants were the result of debility, and that the succulence, the sweetness, or the excessive size, which render them so well suited for food, were only marks of unhealthiness. At least, it is almost necessary to assume this to be the case, in order to account for the efficacy of one of the modes of maintaining races genuine. It is perfectly well known, that, if such an annual as a turnip is transplanted shortly before it runs to seed, the characters of its variety will remain more strongly marked, and have far less tendency to vary, than if, all other circumstances remaining the same, the seed is saved without the process of transplantation having been observed. Now, the only effect of transplanting, at the season immediately preceding the formation of a flower-stalk, would seem to be that of checking the luxuriance of the individual operated on; or, upon the above assumption, of increasing its debility of constitution. And the same explanation appears applicable to a strange custom mentioned by Mr. Ingledew as being practised in the Dekkan, to prevent the rapid deterioration, in that climate, of the carrot, the radish, and the parsnip, the favorite table vegetables of the inhabitants. He states that the Indian gardeners, in the first place, prepare a compost of buffaloes' dung, swine's dung, and red maiden earth, mixed with water till they have the consistence of paste, and scented with a small quantity of assafœtida, the latter of which seems to be perfectly useless.

"The vegetables for this operation are drawn, when wanted, from the beds, when they have attained about one third of their natural growth, and those plants are chosen which are the most succulent and luxuriant; the tops are removed, leaving a few inches from their origin in the crown upwards; and a little of the inferior extremity, or taproot, is cut straight off likewise, allowing nearly the whole of the edible part to remain, from the bottom of which to within about an inch of the crown, are made two incisions across each other entirely through the body of the vegetable, dividing it into quarters nearly to the upper end. They are then dipped into the compost until they are well covered by it, both externally and internally, and are immediately placed in beds, previously prepared for their reception, at the distance of fifteen or sixteen inches from each other, and so deep in the ground that the upper extremities only appear in sight. They are afterwards regularly watered; and when they take root, and fresh tops have made some advance in growth, they require but little attention. The tops speedily become large, and grow into strong and luxuriant stalks, the blossoms acquire a size larger than ordinary, and the seed they produce is likewise large and vigorous, and superabundant in quantity. Innumerable roots are thrown out from the incised edges of these plants; they consequently receive a greater abundance of nourishment, which occasions their luxuriant growth, causes them to yield not only a more than ordinary crop of seed, but also of a superior quality." (*Hort. Trans.*, v. 517.) The operation is performed at the beginning of the dry season.

Besides "roguing out" (i. e. eradicating) all individuals having the slightest appearance of degeneracy from among the plants intended for seed, care must be taken that the crop is so far from any other of a similar kind as to incur no risk of being spoiled by the intermixture of its pollen. This substance is conveyed to considerable distances by wind and insects; and it is scarcely possible to be secure from its influence, if similar crops are cultivated within some miles of each other; whence we find certain villages, in different parts of Europe, celebrated for the purity of the seed of particular varieties; this usually happens in consequence of the villagers cultivating that variety and no other, as happens at Castelnaudary with beet, at Altringham with the carrot, and in Norfolk with different kinds of turnip.

It is, however, to be observed, that the deterioration of seed by bastardizing happens to a greater extent to single plants than to large masses of them; and it seldom happens that good seed can be saved in a garden, or near gardens, from a single individual. Solitary specimens of the turnip, the cauliflower, and such plants, have been frequently selected on account of their perfect characters, and been carefully planted in gardens for a stock of seed, but their produce has as frequently been of the worst description, bearing no resemblance to the parent. In such cases as these, it would seem as if bees and other insects were attracted from all quarters by the gay colors, or odor, of such isolated individuals, and, arriving from a hundred flowers which they had previously visited, bring with them so many sources of contamination.

When, however, the action of other flowers can be prevented, as in the melon and other unisexual plants, by "setting," the largest, healthiest, and most cultivated varieties will yield seed of the purest and finest quality. The tendency of Persian melons to degenerate in this country was remarked soon after their introduction; and, for a long time, it was thought impossible to preserve them for many generations. Mr. Knight, in his numberless experiments upon this fruit, found that to be the case; for his fruit, at one time, became less in bulk and weight, and deteriorated in taste and flavor. But when he came to consider that "every large and excellent variety of melon must necessarily have been the production of high culture and abundant food, and that a continuance of the same measures which raised it to its highly improved state must be necessary to prevent its

receding, in successive generations, from that excellence," the cause of his Persian melons deteriorating became apparent; and he found that by bringing the cultivation of the plants to a state of great perfection, he succeeded completely in rendering the original quality hereditary, as long as those precautions were observed. No man was more successful in the cultivation of the melon than Mr. Knight; and it is in the memory of many persons, that the quality of his sweet melons of Ispahan has very rarely been equalled. The peculiar methods that he adopted appear to have been the complete and most careful preservation of the leaves from injury of whatever kind, the full exposure of their surface to light, and the augmentation of the ordinary warmth of a melon bed by availing himself of the heat reflected from brick tiles with which his bed was paved. To such an extent was his care of the leaves carried, that he would not allow even the watering to be performed "over-head," but he caused his gardener to pour water, from a vessel of proper construction, upon the brick tiles between the leaves, without touching them. (See various papers upon the melon in the *Horticultural Transactions*, and especially that in vol. vii. p. 584.)

While, however, such are the general principles upon which the preservation of the peculiar qualities of the many races of cultivated annuals necessarily depends, it must be confessed that, according to report, there are circumstances upon which science can throw no light, and which, if true, must depend upon conditions as yet unsuspected to exist. Of this class is the following, respecting the Brussels sprouts cabbage, given upon the authority of M. Van Mons.

"Much has been said of the disposition of this plant to degenerate. In the soil of Brussels it remains true, and I have lately observed it to do the same at Louvain; but at Malines, which is the same distance from Brussels as Louvain, and where the greatest attention is paid to the growth of vegetables, it deviates from its proper character, after the first sowing: yet it does not seem that any particular soil or aspect is essential to the plant, for it grows equally well and true at Brussels, in the gardens of the town, where the soil is sandy and mixed with a black moist loam, as in the fields, where a compact white clay predominates. The progress of deterioration at Malines was most rapid; the plants raised from seed of the true sort, which I had sent there, produced the sprouts in little bunches or rosettes, in their true form; seeds of those being saved, they gave plants in which the sprouts did not form into little cabbages, but were expanded; nor did they shoot again at the axils of the stem. The plants raised from the seed of these last mentioned only produced lateral shoots with weak pendent leaves, and tops similar to the shoots, so that in three generations the entire character of the original was lost. From a plant in the state last described, seed was saved at my request, and sent back to me. I had it sown by itself, and carefully watched the plants in their growth; I was not long in discovering that they retained the same character of degeneration they had assumed at Malines, and preserved it throughout the whole course of their growth, yielding pendulous leaves with long petioles, and having no disposition to cabbage. I suffered these plants to run to seed at a great distance from my true sprouts, which the extent of my garden allowed me easily to do. The second sowing brought them back a good deal to their true character; the plants yielded small cabbages regularly at each axil, but not generally full or compact, and they did not shoot a second time, as the true sort does. I again suffered these to run to seed, using the same precaution of keeping them by themselves. I sowed the seed, and this time the plants were found to have entirely recovered their original habits, their head, and rich produce." (*Hort. Trans.*, iii. 197.) I must confess, however, that, although the passage merits quotation, for the sake of exciting attention to the subject, it appears to me very doubtful whether the case has been fully, if correctly, stated.

UPON THE MAKING OF CIDER.

From the London Farmers' Magazine.

The production of good cider must depend upon the description of fruit of which it is made, the season and state of the apples when they are crushed, and the management of the juice whilst it is fermenting. It will therefore be proper to consider the subject under these three heads separately:—

The kind of apple which makes the best cider.—The acid which gives the peculiar quick and sharp feeling upon the palate in good cider, having been first noticed in the apple, although it exists in many other fruits, has been termed the malic acid. It may not be too much to say, that it is the due combination of this acid with saccharine matter, namely, the sugar of the apple, properly fermented, which are the objects to be aimed at in the manufacture of cider. In the selection of the fruit, will depend the proportion of malic acid contained in the liquor. The crab has a much greater quantity of this acid than the cultivated fruit; and generally speaking, in proportion as we obtain sweetness by culture, we deprive the apple of its malic acid. Hence, it follows that some delicious table fruits will not make good cider: this rule, however, is not invariable, as the golden pippin and some other fine apples appear to contain the proper admixture of acid and sweetness which is desirable in the liquor. Mr. Knight recommends that the different sorts of fruit be kept separate, and considers that only those apples which are yellow or mixed with red make good cider, and that the fruit of which the flesh or rind is green are very inferior; he recommends that the apples should be perfectly ripe, even mellow, but never decayed, before they are crushed. There was a curious manuscript written by Dr. John Beale, a fellow of the Royal Society in 1657, upon the subject, from which the following are extracts:—"Crabs and wild pears, such as grow in the wildest and most barren cliffs, and on hills, make the richest, strongest, the most pleasant, and lasting wines that England yet yields, or is ever likely to yield. I have so well proved it already by so many hundred experiments in Herefordshire, that wise men tell me that these parts of England are some hundred thousand pounds sterling the better for the knowledge of it." He mentions of these kinds of austere fruit the Bromsbury crab, the Barland pear, and intimates "that though the discovery of them was then but lately made, yet

they had gotten a great reputation." He adds, "the soft crab and white or red horse-pear excel them and all others known or spoken of in other countries. Of the red horse-pear of Felton or Longland, he says, "that it has a pleasant masculine rigor, especially in dry grounds, and has a peculiar property to overcome all blasts." Of the quality of the fruit he observes, "such is the effect which the austerity has on the mouth on tasting the liquor, that the rustics declare it is as if the roof were filed away; and that neither man nor beast care to touch one of these pears, though ever so ripe." Of the pear called Immy winter pear, which grows about Ross, in that county, he observes, "that it is of no use but for cider; that if a thief steal it, he would incur a speedy vengeance, it being a furious purger; but being joined with well-chosen crabs, and reserved to a due maturity, becomes richer than good French wine; but if drunk before the time, it stupefies the roof of the mouth, assaults the brain, and purges more violently than a Galenist." Of the quality of the liquor he says, "according as it is managed, it proves strong Rhenish, barrack, yea, pleasant Canary, sugared of itself, or as rough as the fiercest Greek wine, opening, or binding, holding one, two, three, or more years, so that no mortal can yet say at what age it is past the best. This we can say, that we have kept it until it burn as quickly as sack, draws the flame like Naphtha, and fires the stomach like aqua vitæ." Thus there appears a great difference between the opinions of the two men who probably paid more attention to the subject than any other; and the question naturally arises, is the cider and perry of the county as good or better than it used to be, after greater attention having been paid to the orchards? I am decidedly of opinion that it is inferior; and it was this impression which caused me to venture to call your attention to the subject. If such be the case, it is a great object to ascertain what has caused the deterioration in the liquor. I believe that it is for want of a due proportion of the peculiar acid which is found in the greatest quantity in the wild fruit; and beg to suggest whether it would not be worth while to try back, and mix a certain quantity of crabs with the fruit before it is crushed. We have many of us tasted, and all heard of, the Stire and Hagloe crab cider, both of which were so celebrated for their rich quality; and these fruits differed little from wild apples. It is known that the juice of crabs, if kept long enough, will make excellent vinegar; every housewife knows that, however sour the liquor may be at first, it will not answer for pickling, but that if kept a sufficient time, there is no better for the purpose. It cannot be supposed that one acid is changed into another without passing through an intermediate stage, and this must be the malic acid, having been converted into sugar, which it appears in the ripening of fruit it has a natural tendency to do. The object in making cider of such fruit, is to prevent the sugar when formed passing on to the acetous fermentation. A singular circumstance occurred at Baysham: a hogshead was filled with crab juice, intending to keep it till it became vinegar; but the cask was tapped by mistake, and supposed to be cider until it was all drunk, which in fact it was. Crab juice ferments much more slowly than the juice of the apple, propably owing to there not being enough sugar already formed in the liquor: but I am of opinion that if some of the heading from a cask of cider in a state of fermentation were added to the crab juice, it would ferment as readily, and clear itself as soon, as the juice of the apple. Owing to the slowness of its fermentation, it takes a great deal of time to convert the juice of crabs into vinegar; but it is found that if, after crushing them, the must be put into a cask for some days, till it heats considerably, and that if the liquor afterwards be ground with this must and pressed again, it will pass into vinegar immediately. I therefore strongly recommend a mixture of the most austere and hardest apples which can be procured with the soft and mellow fruit before it is crushed.

The best time of the year for making cider.—It has been before observed that Mr. Knight recommends the fruit to be perfectly ripe, even mellow, before it is crushed; and this can only happen late in the autumn. As it is known to be more difficult to manage the fermentation of the liquor in warm weather, it is usual to defer making cider till November and December; if, however, the liquor can be put into a cold cellar after the first fermentation is over, I am of opinion that it might be commenced earlier. The juice of unripe fruit ferments more quickly than of that which is ripe, and contains more malic acid. Where there is the convenience of a good underground cellar, the difference of temperature between that and the outward air is greater in moderately warm weather than in November; so that if the liquor were fermented under sheds, as Mr. Knight recommends (and his instructions as to the management of the cider whilst fermenting are excellent,) and as soon as fine, removed into the cold cellar, the change of temperature would be greater at the end of September than in November; and this would probably tend greatly to prevent the liquor fermenting again. If the new cider cannot be removed from the warmth of the atmosphere, there can be no question that it is better to defer the making till the weather becomes cool.

Fermentation of the juice.—The researches of scientific men, although very elaborate, have done very little in throwing light upon the nature of fermentation; it appears to partake in a measure of the vital principle; of the phenomena attending which, we know nothing. Many curious and interesting facts have been discovered during the investigation, but none of which appear likely to be of much use in the making of cider. There are three kinds of fermentation, or rather, there are some products which pass regularly through three stages of fermentation, viz., the vinous, the acetous, and the putrescent. Other substances pass at once to one or other of the latter stages; gum and water turning to vinegar without forming any spirit, and meat at once putrefying. It is not desirable that the vinous fermentation should be complete in the manufacture of cider, in which case all the sugar of the apple would be converted into spirit; this never does happen without a portion of vinegar being also formed, the acetous fermentation going on jointly with the vinous, as, when cider frets a great deal it may be very strong, but is comparatively of little value, having lost all its richness and become sour. The vinous fermentation stops naturally before it has run its course, and it is the object of the maker to avail himself of this property in the liquor, and to endeavor to prevent any secondary fermentation

taking place; the number of schemes which have been suggested to prevent which, showing that it is the most important point to be attended to in the manufacture of good cider. I am of opinion that the 100 gallon cask is much better than larger, and that the liquor is not only more easily managed, but more likely to be good; it may be that cider in large casks becomes stronger, but not so frequently rich, as in single hogsheads. Although it may not be apparent, fermentation commences as soon as the juice is expressed from the fruit; and the sooner the cask is filled and allowed to remain quiet, the more regular and certain will be the process. What should we think of a brewer who, whilst his beer was working, brewed another quantity, and added the raw wort to the first? Yet this is constantly done in filling a large cask with cider; or even worse, for the apple juice is added cold, whereas the wort might be mixed with the beer whilst warm. It would be greatly better to keep the liquor in open tubs till enough be obtained to fill the cask, and then put it together at once. If I may be allowed to suggest an experiment, there is one use to which I should be very glad to see a large cask applied; that is, to fill it partly with *fresh* must, and the remainder with boiling water; the probable result would be a very pleasant and useful liquor. Temperature has much to do with fermentation, and it would be of advantage to have two cellars, one much colder than the other. If the liquor, upon pitching fine, were racked into a clean cask, and put into a cold cellar, there would be much less risk of its fermenting again. I should recommend no other liquor to be added to it; but in order to prevent ullage, that it should be racked into a smaller cask; the less air admitted the better, and if the cask be sound and iron bound, it may be better to close it altogether at this time. The application of cold will check fermentation immediately. I have seen liquor in a state of froth, boiling out of a large jar, suddenly reduced to a state of quiescence by pumping upon the side of the jar. This fact induced me to cause an experiment to be tried at Gayton during a very bad season for cider making, the weather being very warm: a cask of juice was rolled from the mill into a brook of cold water, and sunk by stones attached to it; it remained in that position till nearly Christmas, and was so much better than any other made there that year, that Mr. Newman obtained double the price for that hogshead he did for any of the rest. Perfect stillness is very desirable, as motion is found to excite the acetous fermentation. A bottle of wine, attached to the sail of a windmill in motion was, after three days, converted into vinegar, although closely corked. When a second fermentation does take place in cider, there is very little hope of its being rich and good. In such case I should recommend its being drawn out into tubs, exposed to the cold as much as possible, and after being thus flattened put back into the cask, at the same time well stirring up the whites of fifteen or twenty eggs previously mixed up with a portion of the liquor; if this succeed in fining it, which probably it will, it may then be racked into a clean cask, and closed as much as possible from the air. It is probable that a great deal of mischief is caused by some principle of fermentation remaining in the cask; this might be prevented by well scalding before the casks are filled; or what I think would be better, by washing out the casks with clear lime water:—one large piece of lime put into a hogshead of water, and allowed to settle, would answer the purpose. Some brimstone matches burned in the cask would have a great tendency to prevent fermentation. I shall not say much upon the mode of crushing the apples and pressing out the juice, having had so little practical experience, but I have always thought that if the fruit were crushed between wooden rollers, and allowed to drain before being put under the stone, that the process would be much expedited, as the apples sometimes roll before the stone a long time before they are broken. In Ireland they use a press formed by a lever, which might be made at less expense than with a screw, and be more quickly worked: it is impossible the pressure can be too light at first, and it should be increased gradually as the liquor runs from the must. Two sets of bags, allowing one to drain for some time without pressure, would be an undoubted advantage.

EDWARD PRICHARD.

Ross.

MAKING DIPPED CANDLES.

From the Journal of Commerce.

The season of the year has arrived for families in the country to make up their supply of candles for the year, and as much trouble and extra labor is occasioned by want of skill, I will, in order to enable people to obviate this, give some brief directions for dipping candles.

The tallow, when melted, should be ladled into a wooden vessel of convenient width and depth, which has been previously heated by filling it with boiling water for an hour or more. Fill the vessel within an inch of the top with melted tallow, and keep it that height by adding hot tallow or hot water. By this means the candles will be kept of a full size at the top, and not taper off to a point, as is often seen with country candles.

The tallow, when used for dipping candles, should not be too hot. A temperature that will allow the finger to be dipped in without burning, is sufficiently hot, and at this temperature the candles will take on the tallow very fast. The wicks should be lowered into the melted tallow gradually, and should be lifted out of the tallow so slowly that when the bottom of the candles are clear from the surface of the melted tallow, no tallow will run off them. When the candles are raised quick out of the melted tallow, the tallow will run off the candles in a stream, whereas if the candles are raised out slowly, not a particle of tallow will fall from the candles. A few trials will satisfy any person in this matter. If the tallow is boiling hot, the wick will not take on the tallow to any considerable extent. When candles are raised out of the tallow rapidly, the candles will be large at the bottom, and the tallow will extend below the wick, so that when burnt in the candlestick a piece of the candle will have no wick in it; and therefore, for burning, will be useless. Where persons have no suitable wooden vessel, an iron vessel will answer for a dipping vessel. When tallow has been thoroughly melted over the fire, should it be dirty or impure, throw into it, while hot, a small quantity of finely

powdered alum, and in a short time a scum will be seen rising to the surface, in appearance like dirty froth. Skim this off as it rises. This scum will rise for half an hour or more. These directions are plain and easily complied with, and one trial will be satisfactory. Persons, by following these directions, will save more than one half the usual labor of making candles, besides having better candles. I speak from abundant experience, and therefore with full confidence. E. M.

KENTUCKY BLUE GRASS (GREENSWARD, POA PRATENSIS.)

From the Nashville (Tennessee) Agriculturist.

The best time for sowing is as soon as you get ready after October, but if you sow before the middle of March, you may expect a good stand, particularly if the season is wet.

Land.—Old fields, where the sun can exert all his powers, produce blue grass in the greatest abundance, and always of the best quality. The past fall we visited Mark R. Cockrill's farm, and saw old fields on which former occupants were threatened with starvation, yielded the richest grass. It was remarkable that his mares and sucking colts, on these pastures, without grain, were fatter, if possible, than we ever saw "the noble animal" on other treatment. But inasmuch as cultivated grounds are generally used for other purposes, the beginner is informed that woodland, particularly where the timber is not too loose, will produce good grass.

Preparation.—If you intend old land for pasture, break up the fields, and sow them in oats in February. Then put ten lbs. of blue grass seed, a half a gallon of red clover seed, and if a little timothy or orchard grass be sprinkled on so much the better. The clover, timothy and orchard grass will give a quick pasture and afford protection to the blue grass till it gets a strong hold, after which no other grass can contend with it. If woodland is to be sown, take off the logs, brush, leaves, &c., and if the undergrowth could be taken out, it would be much better. After the land is cleaned, harrow it well, then sow your grass seed at the rate of ten or twelve pounds to the acre, but if you put on fifteen or twenty pounds, you will scarcely ever regret it. The rains will sufficiently cover the seed to insure vegetation.

ON GUANO.*

By James F. W. Johnston, F. R. S., &c., Hon. Mem. of the Royal English Agricultural Society.

From the Journal of the Royal Agricultural Society of England.

Of the natural occurrence of Guano.—Guano, according to Humboldt, is the European pronunciation of the word "huanu," which in the language of the Incas means dung or manure. The substance long known by this name occurs at various points along the coast of Peru, between the 13th and 21st degrees of south latitude, both on the main land and on the numerous islands and rocks which are sprinkled along this part of the shores of South America. It forms irregular and limited deposites, which at times attain a depth of 50 or 60 feet (Humboldt,) and are excavated like mines of iron ochre. It is not known to exist in any quantity north of 13° or south of 21°; though the flocks of cormorants, flamingoes, cranes and other sea-fowl (from the droppings of which it has been derived,) appear to be equally numerous along both the more southerly coast of Atacama and the more northerly shores of Arequipa.

Mr. Winterfeldt, who appears to have more recently visited the west coast of South America, has published the following additional information in Bell's Weekly Messenger of the 11th of September, 1841:—

"There are three varieties of guano—the red, the dark-gray, and the white. The first two are met with in the isles of Chincha near Pisco, at

* Perhaps some readers may deem the subject of this article, however curious as a matter of history and of natural science, of no practical value, and therefore not worth the space it will here occupy. But the subject is not only one of interest as a very remarkable, and until now unexplained, fact in natural history, but the circumstances, as now explained, throw important lights on agricultural science. That the excrement of sea-birds, a substance among the most putrescent, and consequently elsewhere of fleeting existence, should have remained in mass for ages, and in the torrid zone, was of itself sufficiently remarkable. And the fact had been of enough importance to be recorded in history, because of the immense value of the manure, and the great use made of it, by water transportation, by the ignorant aboriginal inhabitants of Peru, and by their Spanish conquerers and their indolent descendants. Added to these facts, the deposites of excrements were so enormously thick and extensive, as almost to amount to the importance of a geological formation.

It now appears that the absence of moisture (from rain) prevents putrefaction, in a great degree; and this most remarkable, because vast effect, of a well-known law of fermentation, will serve to show to farmers, in all regions, that without moisture their manure loses nothing by the sun and air. The great richness of *guano*, and its value as manure, after all the actual waste of its most volatile parts for centuries, shows strongly the great value of *ammonia*, no matter from which of the many sources it may be obtained; and the importance of preventing its waste from all manures which evolve it during putrefaction. And in addition to these general theoretical truths, of various and extensive application in practical agriculture, it *may be* that the products of this immense mine of manure in the Pacific ocean, may hereafter be brought to benefit American, as it has already done British agriculture. This may be still the more strongly counted on, now that it is ascertained that the most recent guano is far more rich than the ancient, which is what has been mostly exported heretofore.—Ed. F. R.

Iquique, and on the hill of Pica. The term 'guano of Iquique' is sometimes used from its having been first procured from the island of that name. This island is situated about 400 yards from the port of Iquique. It is about half a mile long, and about 200 yards broad; and furnished large quantities of guano for 25 years, when it became exhausted. The hill of Pica is very high, and is covered with guano down to the water's edge; while that side which does not face the sea is of sand and gravel. In this hill or rock I am informed that a silver-mine was formerly worked, but that no trace of guano was found during the excavation. The adjoining hills on either side are of sand, which is carried by the winds, and covers up the guano; to remove which the sand is first taken away, and deep excavations are made; the guano extending nearly a quarter of a league in length, and 300 *yards in depth.** It is likewise found at St. Lobos, about three leagues to the south of Pica; but, as the anchorage is dangerous, little business is done here."

Origin of the guano.--The extraordinary thickness and extent of these deposites of guano seem at first sight to throw discredit on the statement that it is altogether derived from the dung of the countless flocks of sea-fowl which frequent the islands and rocks of the Peruvian shore: yet the evidence on this point is perfectly satisfactory. The living birds still deposite the white guano on the islands to which they resort. In the isles of Islay and Jesus 20 to 25 tons of this recent guano are occasionally collected in a single season. In the island of Torrecilla the white may be seen changing into the red variety (Winterfeldt;) while, in the midst of the great accumulations of the latter kind, bones and feathers (Frezier) of birds are found, as if to remove any doubt which might still remain as to its origin. Its real origin, indeed, was well known to the government of the Incas, and its national importance fully understood. It was made a capital offence to kill the young birds on the guano islands. Each island had its overseer; and as the whole coast from *Arica* to *Chaucay*, a distance of 200 leagues, was manured almost entirely with guano, each island was assigned to a special district of the main land, and its produce was conveyed to that district alone. (Humboldt.)

It was not till the arrival of the Spaniards that the original source of the guano was for a time doubted; yet, when we consider how great a lapse of time it must have required to admit of the accumulation of the extensive beds of ancient guano still known to exist, we cannot wonder that early European visiters should have received with hesitation what we now readily admit as the true account of its origin. Of late years the increase of traffic on the coasts has disturbed or driven away the birds, and thus materially diminished in many localities the annual produce of the white or recent guano. "Since the opening of the port of Islay the birds have nearly deserted the adjacent inlets." (Winterfeldt.)

It may be further added on this point that the chemical constitution of guano has been found to be exactly such as is to be expected from the above account of the mode of its production.

Why, it may be asked, does this substance accumulate within the eight degrees of latitude above stated only, though the sea-fowl are said equally to abound beyond these limits? This question involves a consideration both of the chemical nature of the substance itself and of the physical condition of the country in which it accumulates: it will be more naturally discussed, therefore, in a subsequent section.

Effects of guano on vegetation.—It is known to have been a common practice to manure with guano as far back, at least, as the twelfth century; and the possibility of raising crops on the sandy plains of Peru is said to depend altogether on the application of this substance.* (Humboldt.)

"In a soil of remarkable sterility, composed only of white sand and clay, it is sufficient to add a small quantity of guano to be able to reap the richest harvests of maize." (Boussingault.)

"It has been calculated that from 600 to 700 tons are annually sold in the port of Mollendo, for the use of the country around the city of Arequipa. In the province of Taracapa, and in the valleys of Tambo and Victor, the consumption should be something more; as wheat, all kinds of fruit-trees and plants, with the single exception of the sugar-cane, are manured with the guano: which is not the case with the district of Arequipa, where maize and the potato alone require it. In the district of Arequipa 3 cwt. of the guano is spread over an extent of 5000 square yards;† but, in Taracapa and the valleys of Tambo and Victor, 5 cwt. are required. The land thus manured in Arequipa produces 45 for 1 of potatoes, and 35 for 1 of maize; where wheat, manured with horse-dung, produces only 18." (Winterfeldt).

In 1828 the annual consumption of white and brown guano in Peru was estimated at 600 or 700 tons in all; but this is probably now much below the truth.

These facts afford sufficient evidence of the value of this substance as a manure in the soil and climate of Peru. It has recently, however, been imported in large quantities into this country, and has already been tried upon various crops and soils, and with highly satisfactory results. Several of these results have been obligingly communicated to me; and, as the subject is an interesting one to the agriculturist, I shall insert them in the words of my several correspondents.

1. *Experiment of Mr. Pusey.*—"The guano was applied, in the beginning of July, to half an acre of ridged Swedes, at the rate of 3 cwt. to the acre, drilled under the seed. Bones, Poitevin's manure or night-soil, dung, urate, and peat-ashes, were applied at the same time on neighboring pieces of ground. The first action of the guano was discouraging; for, on one half of the ground dressed with it, no plant came up. On transplanting into the blank spaces, the seed was found encrusted with the guano, without any sign of vegetation. This ill effect might be easily

* Mr. Winterfeldt can scarcely mean that the layer of guano is actually 900 feet in thickness: it probably climbs up the mountain side so high. Pica and Iquique are both within the latitude of 21° S., the limit assigned by Humboldt.

* We have seen how it was prized by the ancient Peruvians. About Villacori this people also manured with a species of small fish, taken in great abundance on the coast.

† 4840 square yards make an English acre.

guarded against. Notwithstanding this check, the piece dressed with guano now (Nov. 11) appears to be superior to all the other plots excepting that which was dressed with dung."

2. *Experiment of Mr. Love, of Castle Farm.*—"I have made trial of the guano for rape and turnips, and in both instances, I am happy to inform you, it answered my most sanguine expectations. I mixed 14 lbs. of it, in the first trial, with 2 bushels of ashes; and although the weather was very dry, I could perceive a marked difference in the growth of the plants a few days after they made their appearance. Encouraged by my results, I next mixed 28 lbs. with 15 bushels of ashes, and applied it for turnips, by sowing it on the furrow, broadcast, and harrowing it in lightly; and, as we had frequent showers at the time, the seed soon vegetated, and the plants grew away from those on each side, and were large enough to hoe 2 or 3 days before those on the land I had manured in my usual way with dung and mould. In each case I applied at the rate of 2 cwt. per acre. The ashes I mixed with it were dry, and such as we usually obtain by burning round the hedgerows and borders of our fields. I have no doubt of its being a very powerful manure; and, on very poor soils, I think I should put on 1 cwt. per acre more than I did this summer, especially if I could not procure ashes in sufficient quantities to mix with it."

3. "*Mr. Westcar, of Burnwood, Surrey*, tried 7½ lbs. upon 5 rods of land, drilled in with barley and clover. Upon other 5 rods he applied the best farm-yard manure, at the rate of 18 loads to the acre, and sowed on these an equal quantity of the same seeds. The result was—

From dung, 18 loads to the acre 1 bushel 3 quarts.
From guano, 2 cwt. to the acre 1 " 7 "

Being a saving of expense in the manure, with an increase in the crop."

4. "*Mr. Smith, of Gunton Park*, applied 4 bushels, about 200 lbs., of guano to a statute acre; and on another equal portion of land on the same field, applied 15 bushels (6 cwt.) of bone-dust. Both were drilled into the ground with the seed wheat. The guano gave 6 quarters 2 bushels 1½ peck; the bone-dust only 4½ quarters of wheat."*

5. *Experiment of Mr. Skirving, at the Walton Nurseries, near Liverpool.*—"Three plots of ground were manured respectively with guano, nitrate of soda, and farm-yard manure; and to a fourth portion nothing was applied. All the four were sown with Italian rye-grass, on the 19th of May; and all were cut on the 2d of August last. The results were as follows:—

	Tons.	cwt.	lbs.
Guano, 3 cwt. per acre - -	14	15	26
Nitrate of soda, 3 cwt. per acre	14	13	37
Farm-yard manure, 20 tons per acre - - - -	13	2	96
Without manure - -	7	0	108

Mr. Skirving adds "that the experiment was made on poor light black soil, inclining to peat. The land was first dug over, and then the manures spread on it and lightly dug in. On account of the very dry weather at the time of sowing, the seed did not come up very soon on any of the plots, but when the rain came the crop appeared; and on the nitrate of soda and guano made more rapid progress, by a great deal, than on the farm-yard manure, and continued to do so until I was obliged to cut the crop, its luxuriance being such, both on the guano and soda, that it was all down and lodged, and injured the roots.

"The second crops on these manures will differ in point of weight, I have no doubt. At present the farm-yard manure takes the lead; the guano is next; but the crop on the nitrate is by no means making the same progress.

"I have tried the guano on several other crops, in different proportions, and all prove very much in favor of its being a most valuable manure; and the produce from it, as in the case of farm-yard manure, will be in proportion to the quantity laid on—at least, as far as 8 cwt. to the acre: beyond that, I fear, it would be too powerful for any crop."*

These are all the experiments of which the results have been transmitted to me. Though they leave very much to be desired, yet they are sufficient to show—that in the climate and on the soils of England the guano is fitted to promote vegetable growth nearly as much as on the arid plains of Peru.

Chemical composition of guano.—To what cause are we to ascribe this extraordinary effect of guano in fertilizing and increasing the produce of the land? What does it contain that renders it so grateful to vegetable life? We know that pigeons' dung and the liquid manure of the farm-yard act upon vegetation almost, if not quite, as efficiently as the guano; and as this latter substance has precisely a similar origin, we can in some measure understand from analogy only, why it should be so useful as a manure. A clear comprehension, however, of the kind and extent of its action on vegetable life, and of the circumstances under which it is likely to be most beneficial, can only be obtained from the study of its chemical constitution.

The first analysis of this substance was, I believe, published by Klaproth (Beitrage, Th. iv. p. 299); the specimen having been furnished to him by Humboldt. He found it to consist of—

	Per cent.
Urate of ammonia - - - -	16
Phosphate of lime - - - -	10
Oxalate of lime - - - -	12.75
Silica - - - - - -	4
Common salt - - - - -	0.5
Sand - - - - - -	28
Water and other organic and combustible matter - - - - -	28.75
	100

* Communicated by Mr. Macdonald, of St. Mildred's Court, Poultry; as were Nos. 2 and 3 also.

* These experiments would have been much more valuable had the results been given in the state of *dry hay* instead of that of *green grass*. The reason of this is, that different samples of grass from the same field yield often very different proportions of dry hay. Thus 100 stones of grass, cut from each of six different half-acres—treated with different manures—in the same field, near Aske Hall, Richmond, gave respectively of dry hay 52, 53, 36, 46, 40, and 36 stones. No accurate conclusion therefore can be drawn from the weights of the green grass yielded by the several parts of a field.

The next analysis was by Fourcroy and Vauquelin (Gehlen's Jour., vi. p. 679.) Their results gave—

	Per cent
Urate of ammonia	9.0
Oxalate of ammonia	10.6
Oxalate of lime	7.0
Phosphate of ammonia	6.0
Phosphate of ammonia and magnesia	2.6
Sulphate of potash	5.5
Sulphate of soda	3.3
Sal ammoniac	4.2
Phosphate of lime	14.3
Clay and sand	4.7
Water and organic matters	32.3
	100

If we suppose the analyses equally correct, the specimens examined severally by Klaproth and by Vauquelin differed very much in chemical constitution. That of Klaproth was mixed also with one-third of its weight of sand and silica.

To a circular, recently issued by Mr. Macdonald, the following analysis is appended, but the authority is not given:—

	Per cent.
Bone earth	30½
Sulphates and muriates	3
Uric acid	15
Ammonia	15
Other organic matter	36½
	100

This also differs materially from the other two; and, allowing for slight errors in analysis, shows that the substance varies widely in composition. It cannot fail, indeed, to vary to some extent, according to the state of decay in which it is subjected to examination.

Of the guano which has been imported into this country a box having been obligingly sent to me by Mr. Macdonald of the average quality of that which, as he states, is likely to be hereafter brought to England, I have submitted it to a chemical examination, in reference chiefly to its economical value. It is of a brownish-red color, is evidently a very ancient deposite, and has undergone much decomposition. It consists of a powdery portion mixed with lumps of various sizes. The latter, when broken, exhibit an aggregation of minute crystalline plates, are much richer in ammonia than that which is in powder, and are freer from sand and stones. When broken up, however, the lumps speedily lose their crystalline appearance, give off ammonia even at the ordinary temperature of the atmosphere, and assume the condition of the powdery portion with which they are mixed.

1. *The quantity of sand* contained in a portion of the powdery variety I found to amount to nearly 11 per cent.; while in one lump there were present 8 per cent., and in another less than 2 per cent. The sand consisted chiefly of mica, quartz, and felspar, the debris of the igneous rocks of the coast of Peru. Occasional fragments of rock occur, of considerable size also, among the guano.

2. The quantity of volatile or combustible matters, (including the water and ammoniacal salts) which are capable of being driven or burned off by a red heat is also very variable. Thus, 4 portions, taken at random from different parts of the box, lost, respectively, 23½, 46, 60, and 53 per cent. of their whole weight; leaving an ash of a white or slightly gray color. This difference is not owing to the presence of unlike quantities of sand, for the numbers above given are calculated on the supposition that the specimens were all free from sand. Thus the first specimen lost by heating only 21½; but, as it contained 8 per cent. of sand, it would have lost, as stated above, if free from sand, 23½ per cent.

In so far as the volatile constituents are concerned, therefore, the guano which comes to this country may vary in value from 1 to 3.

3. Yet the loss by heating, which is very easily ascertained, is not a true measure of the richness of the guano in ammonia and other valuable organic matters. When reduced to powder it rapidly absorbs moisture from the air. Thus, in 48 hours, a weighed portion of a lump broken into coarse powder gained by exposure to the air 2 per cent.; another portion gained in 10 days no less than 6 per cent., and after a longer time it became perceptibly moist between the fingers. This absorption of water from the air will tend not only to depreciate the value of a given weight of the guano when brought to our humid climate, but also to cause errors in the results of agricultural experiments made with different samples of the manure.

4. I have stated above that the lump guano when crushed gives off ammonia at the ordinary temperature of the atmosphere. In hot weather this may be rendered sensible by holding over it a feather dipped in strong vinegar or diluted muriatic acid (spirit of salt,) when white fumes will be perceived; or at any time by heating the guano to 100° or 150°. By this evolution of ammonia it loses both in weight and in virtue. By drying at 150° I found a lump to lose 11 per cent. of its weight, ammonia being sensibly given off during the whole duration of the experiment; yet when it was again exposed to the air it absorbed so much water as in four days to be 5 per cent. heavier than it had been before it was exposed to heat.*

This evolution of its volatile constituents by exposure to the air is well known on the coast of Perú. From the guano island near Arica such a stench proceeds that vessels are prevented by it from anchoring near the town (Feuillé and Humboldt;) while the white guano at the present day sells in the port of Mollendo at a price more than one half higher than that which is given for the dark-gray and the red. (Winterfeldt.)

I do not know in what way the guano is shipped for transport to this country; but it is certain that were it rammed hard into casks as soon as it is taken from the mine, and so kept in this country till it was about to be applied to the land, it would neither be so far deteriorated by the loss of its volatile constituents, nor increased in weight by the absorption of water.

5. The absolute quantity of ammonia contained in the guano of Klaproth and Vauquelin is not stated. In the analysis published by Mr. Mac-

* If a little guano powder be mixed in a wine-glass with a little newly-slaked lime, ammonia is immediately evolved, and becomes distinctly sensible to the smell.

donald as above given, it is said to amount to 15 per cent.* This greatly exceeds the quantity contained in the specimen examined by myself, which gave me only 7 per cent. of pure ammonia. The same is true of the uric acid, which in my specimen did not amount to 1 per cent.† In these results a certain latitude must be allowed for necessary differences, since the older the deposite, the less rich must the guano be in uric acid and ammonia.

6. An important ingredient in the guano is the phosphate of lime, and as this substance is neither volatile, so as to rise into the air, nor soluble, so as to be washed out by the rains, it is obvious that the older the deposi e and the less volatile matter it contains, the richer it is likely to be in this earthy phosphate. Supposing each specimen free from sand, &c., the analysis of Klaproth gives 14.7 per cent., and that of Vauquelin 15 per cent., while the bone-earth in the third analysis is stated at 30½ per cent.

In two portions which I examined, the phosphate of lime amounted in the one to 29, and in the other to nearly 43 per cent. of the guano supposed to be free from sand. In regard to this substance, therefore, the guano is no less variable in composition than in regard to its other constituents.‡

7. When cold water is poured upon guano a large portion of soluble matter is taken up, consisting chiefly of common salt and of various salts of ammonia, with a very little of the urate of soda, lime and magnesia. After careful washing with water and drying at 150°, one portion left 40 and another 35 per cent. of insoluble residue, consisting of phosphate and oxalate of lime with some urate and other animal matters. It is these soluble salts which act most immediately and most powerfully when the guano is applied to the growing crop. The earthy constituents, though of great importance to the ultimate growth and health of the plant, begin to manifest their influence at a later period.

8. I have not thought it necessary to determine with accuracy the relative proportions of the oxalic and carbonic acids, or of the several salts of ammonia, in a substance so variable in its constitution. In the only specimen in which I sought for it I detected no sensible quantity of potash. It is true that Fourcroy and Vauquelin found 5½ per cent. of sulphate of potash, but this can only be considered as accidentally present in the specimen they examined, since it is not easy to understand how potash should be more abundant than soda in the excrements of sea-fowl, living almost entirely upon the fish of the Pacific Ocean.

9. Finally, the variable constitution of the guano brought to this country, and now offered for sale in England, will appear by the following *general* results of the analysis of two small portions taken at random from a box containing about 20 pounds' weight. The first contained 8 per cent. and the second only 1 1·5 per cent. of sand.

1.	per cent.
Water, salts of ammonia, and organic matter expelled by a red heat -	23·5
Sulphate of soda - - - -	1·8
Common salt, with a little phosphate of soda - - - - -	30·3
Phosphate of lime, with a little phosphate of magnesia and carbonate of lime* - - - - -	44·4
	100

2.	per cent.
Ammonia - - - - - -	7·0
Uric acid - - - - -	0·8
Water and carbonic and oxalic acids, &c. expelled by a red heat -	51·5
Common salt, with a little sulphate and phosphate of soda - -	11·4
Phosphate of lime, &c. - -	29·3
	100

On the cause of the fertilizing action of guano.—Though so variable in composition, however, the nature of the substances it appears always to contain enables us to explain why it exerts so marked an effect on the growth of plants, as well as to answer one or two other questions—in regard, for example, to the duration of its action in fertilizing the land—and to the cause of its accumulation on the coast of Peru.

1. The most important and most active ingredient contained in the decomposed guano imported into this country is the ammonia. This substance, there is reason to believe, acts in a most energetic manner upon vegetation in every climate—it is one of the most useful ingredients

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* Fifteen per cent. of pure ammonia are equal to 60 of bicarbonate of ammonia, 45 of sal ammoniac, or 40 of oxalate of ammonia. As much of the ammonia in guano exists in the state of bicarbonate, I doubt if any of the specimens which come to this country can ever contain so much as 15 per cent. of pure ammonia.

† One hundred grains of guano distilled with dilute caustic potash, and the ammonia received into dilute muriatic acid, yielded, on evaporation at 212°, 21.5 grs. of sal ammoniac, equal to about 7 grs. of ammonia. The uric acid was separated by boiling in dilute caustic potash, and precipitating by dilute sulphuric acid.

‡ Boussingault, after describing the astonishingly fertilizing action of the guano on the plains of Peru (Annales de Chim. et de Phys., lxv. p. 319,) says that it consists of urate, oxalate, phosphate, and carbonate of ammonia and *some earthy salts*. This distinguished philosopher, to whom modern agriculture owes so much, inclines to the hypothesis "*that the fertility of the soil can be increased only by the addition of substances containing nitrogen.*" (ibid. lxvii. p. 16,) and therefore pays less regard to the earthy matters which may be added to the soil. We are indebted to Sprengel for illustrating the important influence of inorganic substances in *nourishing* and promoting the growth of all living vegetables.

* The results above given indicate the proportions of the alkaline and earthy salts as they existed in the ash that was left when the guano was heated to redness in the air. The chemical reader will understand that very different numbers would have been obtained had the soluble salts been separated from the insoluble before either of them was heated to redness. This arises from the circumstance that, when the crude guano is heated, the phosphate of ammonia and oxalate of lime are simultaneously decomposed, and phosphate of lime is formed, whereas, were the phosphate of ammonia previously removed by washing, the oxalate of ammonia would, by the burning, beconverted only into carbonate. With a view to a merely *economical* object it did not appear to me necessary to enter into a rigorous examination of the relative proportions of the several salts of ammonia present in such variable quantities in the guano.

in our farm-yard manures, and though writers differ in opinion as to the amount of influence actually and constantly exercised by this compound on the *general vegetation of the globe*,* they all agree in attributing to it a very beneficial action on growing plants in general, when applied to them in a sufficiently diluted state. In proportion, then, to the quantity of ammonia it contains will the value of the guano be increased, and hence one reason why the more recent varieties should be accounted the best, and should bring the highest price in the market.

2. Next to the ammonia, or perhaps equal to it in value, though in the specimens I examined very much less in quantity, is the uric acid. This substance, as it decomposes, gives rise among other products to the formation and evolution of ammonia in considerable quantity. Under the most favorable conditions 100 of pure uric acid *might* yield 40 of pure ammonia. In nature, however, these conditions probably never occur, so that during its decomposition, numerous other products containing nitrogen are formed (prussic acid among the rest,) which it is unnecessary here to specify. We know little that is certain in regard to the action of these products on the growth of plants, but the well-known effect of liquid manure, which in a state of fermentation contains the most of them, leads to the belief that they are fitted to promote vegetation.

The *fresh* guano is more valuable, chiefly because it contains more of this uric acid in an undecomposed state. We have no analyses of the recent droppings of any of the birds which frequent the shores of Peru; they would probably be found to differ in some degree, not only with the species of bird, but also with the kind of fishes on which at different seasons of the year they were found to prey. We possess analyses, however, of the excretions of other birds which live chiefly upon fish, from which we are enabled to form an opinion as to what the recent guano is likely to be. Thus Dr. Wollaston found those of the gannet, (Pelicanus bassanus,) when dry, to contain little else but uric acid, while in those of the sea-eagle, Coindet found—

Solid Excretions.

Ammonia - - - - - - -	9·2
Uric acid - - - - - - -	84·65
Phosphate of lime - - - - -	6·13
	100

Liquid Excretions dried.

Uric acid - - - - - - -	59
Earthy and alkaline phosphates, sulphates and chlorides - - - - -	41
	100

If we compare the first of these results of Coindet with the constitution of the guano as it is imported into England, we cannot fail to be struck with the degree of decomposition which the latter must have undergone—supposing it to have originally resembled the solid excretions of the sea-eagle. The quantity of phosphate of lime in the latter, 6·13 per cent., is unusually large for the excrement of a bird; but if we suppose the recent guano in its dry state to have contained quite as much, it would require 500 lbs. of the latter to give the quantity of phosphate (29·3 lbs.) contained in 100 lbs. of a quality such as the one portion I examined, and 700 pounds to yield the quantity of phosphate (44·4 lbs.) contained in the other. In other words, from 1·5 to 1·7 only of of the original organic animal matter remains in the guano, as it is imported into England. It probably retains even less, since it has unquestionably absorbed from the air a considerable portion of moisture not supposed to be present in the droppings when recent and carefully dried.

It is easy to see therefore why the *recent* guano should bring so much higher a price on the coast of Peru; why the ancient Peruvians should have so carefully collected it, and should so religiously have preserved the sea-fowl from destruction or disturbance; and why they should have left the ancient accumulations comparatively undisturbed; to be searched for and excavated in these after times when the produce of the living birds has become less abundant or is less carefully collected and preserved.*

On the other hand, in the identity of the substances contained in guano with those always found in the recent excretions of living birds, we have that evidence of a common origin—which in a previous part of the present paper was stated to lend an almost unnecessary confirmation to the evidence there adduced in regard to the source from which the accumulations, on the shores of Peru, have unquestionably been derived.

One other remark I may here venture to introduce. We are astonished—even geologists, who are familiar with extended periods of time, and are accustomed to contemplate immense results produced by the prolonged action of apparently insignificant causes—even geologists are struck with the occurrence on the existing surface of the globe of such vast accumulations of excrementitious matter: yet how are our ideas still further magnified in regard both to the number of birds necessary to deposite them, and to the lapse of time during which they must have been gathering, when we learn that what now remains is not —either in bulk or in weight—more than an eighth or a tenth part of that which originally fell from the flocks of living sea-fowl!

3. A most important part of the composition of the guano is the quantity of phosphoric acid it contains in combination with ammonia, with soda, and chiefly with lime. All plants require for their healthy growth a portion of this acid in combination with lime. All vegetable productions which unmixed are capable of feeding and nourishing animals must contain it, since from their vegetable food all animals ultimately derive those earthy and other phosphates of which so great a part of their bones consists, and which

* The prevailing views on this subject, and the reasons on which they are founded, are explained in my 'Lectures on Agricultural Chemistry and Geology,' part i. p. 248.

* The comparative value of the *recent* droppings of birds is shown by the price usually paid in Flanders for pigeons' dung. It is there employed as a top-dressing for the flax, and the dung of 100 pigeons is worth about 20s. a year for this purpose—(Sprengel.) The injurious effect of recent goose-dung arises from its falling on the grass in too concentrated a state. When diluted by a shower of rain its influence is most beneficial.

are also present in smaller quantity in their fleshy parts, and in their various fluids.

The presence of these substances therefore enables the guano to minister *to a greater number of the wants of living vegetables* than it could do were it entirely composed of uric acid or of ammonia. These latter compounds may abound about the roots and leaves of plants, and yet, if the phosphates be wholly absent, the plant which sprung up of a bright green, and shot forth with vigor, will never attain to a healthy maturity, or produce an adequate return of nourishing food.

One of the uses served by bones when applied to the land is to yield the phosphate of lime they contain to the successive crops which are grown during an entire rotation. Hence one reason why the effect of bones upon the land is in many cases found to be so very permanent. The animal matter in bone dust will decompose and disappear in great measure from the soil in one or two seasons, but the bone earth (the phosphate of lime) remains long in the land, is—in small quantity only, and therefore slowly—withdrawn from the soil by the crops and by other natural agencies. and thus may continue to exercise a beneficial influence on the fertility of the field to which it is applied for a long period of time.

The same remarks apply to guano. On an average, 150 lbs. of guano may contain as much bone earth as 100 lbs. of bones ;* and in the same proportion will its action on the land, compared with that of bones, be permanent—in so far as this ingredient is concerned.

The fact is of great practical importance. Nitrate of soda, so much used of late and so deserving of more extensive trial, may be washed out of the soil where the earthy part of the guano would remain ; it may cease to exert a marked influence after a single crop, where it is scarcely possible that the phosphates of the guano should cease to act ; and it may fail to bring to maturity crops of corn or to fill the ripened ear, when the guano would supply to the grain, among other substances, the earthy phosphates also, which the seed contains as a necessary constituent.

While then the ammonia of the guano promotes the early growth, its phosphates supply to the ripening plant the materials which are indispensable to its perfect developement. The nitrates also, like ammonia, aid in a remarkable degree the growth of the plant in its earlier stages ; but, except the potash or soda which the nitrate may contain, it can supply to the maturing vegetable none of the inorganic substances it is known to require. Unless these are present in sufficient quantity in the soil, the healthy appearance of the young plant, whether imparted to it by the agency of ammonia or by that of nitrate of soda, cannot be safely trusted to as an index of the weight of corn we are to reap, when the time of harvest comes.

4. The presence of common salt in the guano need not surprise us. It is no doubt derived from the sea, partly through the medium of the birds themselves, and partly from the evaporation of the salt spray, continually driven upon the coasts by the winds. It is variable in quantity, as we should expect from a knowledge of its origin. The beneficial effect of common salt when applied to the land has been frequently recognized in many localities and upon many soils. It no doubt aids the other ingredients of the guano in producing its full effect upon the living vegetable.

The important influence of guano, therefore, on the vegetation equally of England and of America, seems to depend upon two circumstances—1st, on its containing a well-tempered mixture of a *great number* of those substances which the plant requires for its perfect growth and developement ; and—2d, on this admixture including a considerable proportion of a substance (ammonia) which in a remarkable degree hastens the growth of the *young* plant, as well as of another (phosphate of lime) which is necessary to its healthy and perfect *maturity*.

In the arid plains of Peru, where dews are rare and rain scarcely ever falls, we can easily appreciate the value of a substance which shall make the young plant as it were rush up when a favorable day of moisture comes, shall facilitate its rapid after-growth, and shall supply the materials necessary to its perfect maturity ere the burning sun and parching winds have time to scorch and wither it. Useful as it is likely to prove in our climate, therefore, the beneficial effects of guano may never be so striking in these latitudes as they have long appeared on the shores of Peru.

The cause of its accumulation on the coast of Peru.—Connected with this last observation is the explanation of the accumulation of the guano on the coast of Peru. I have already stated that, according to Humboldt, it is met with only between the 13th and 21st degrees of south latitude, though the sea-fowl are equally plentiful both to the north and to the south of these parallels. The explanation of this apparent anomaly is to be found in the climate of this part of South America.

Nearly the whole of the land along this coast, between the Cordilleras and the sea, is one continued desert. "I have always," says Mr. Darwin,* "applied the terms barren and sterile to the plains of Patagonia, yet the vegetation there can boast of spiny bushes and some tufts of grass, which is absolute fertility to any thing that can be seen here," (the neighborhood of Copiapo.) "In Peru real deserts occur over wide tracts of country." "It has almost become a proverb that rain never falls in the lower part of Peru." "That much rain does not fall is very certain, for the houses are covered only with flat roofs made of hardened mud ; and on the mole (at Callao) ship-loads of wheat were piled up, and are thus left for weeks without any shelter."† "The town of Iquique contains about 1000 inhabitants, and stands on a little plain of sand at the foot of a great wall of rock 2000 feet in height, which here forms the coast: the whole is utterly desert. A light shower of rain falls only once in very many years ; and hence the ravines are filled with detritus, and the mountain sides covered by piles of fine white sand, even a thousand feet high."‡

It is the dryness of the climate then which has permitted the guano to accumulate on these coasts. When we reach a region in which from

* Four cwt. of guano as much as 7 bushels of bones, supposing the guano to contain about 35 per cent. of phosphate of lime, which is less than the mean of the specimens I examined.

* Researches in Geology and Nat. History, p. 428.
† Ibid. p. 446. ‡ Ibid. 442.

TABLE, SHOWING THE COMPARATIVE CONDITION OF THE BANK OF VIRGINIA, FARMERS' BANK OF VIRGINIA, & EXCHANGE BANK OF VIRGINIA, ON JAN. 1, 1841, AND JAN. 1, 1842,

In regard to their respective rates of outstanding debts, circulation, and specie.

	OUTSTANDING DEBT.			AMOUNT OF SPECIE.			NOTES IN CIRCULATION.		
	JAN. 1, 1841.	JAN. 1, 1842.	DIFFERENCE	JAN. 1, 1841.	JAN. 1, 1842.		JAN. 1, 1841.	JAN. 1, 1842.	
BANK OF VIRGINIA,	5,271,538 08	5,352,713 89	INCREASE. 81,175 81	901,021 66	824,110 02	DECREASE 76,911 64	2,798,385 43	2,790,195 76	DECREASE. 8,189 67
FARMERS' BANK,	4,780,696 83	5,026,402 84	INCREASE 245,706 01	686,262 08	764,798 23	INCREASE 78,536 15	2,295,820 50	2,666,278 50	INCREASE. 370,458 00
EXCHANGE BANK,	2,068,975 06	2,409,555 80	INCREASE 340,580 74	277,502 15	248,256 41	DECREASE 29,245 74	703,860 00	722,575 00	INCREASE. 18,715 00
			Total Increase. 667,462 56			Total Decrease. 27,581 23			Total Increase. 380,983 33

local causes the dews are heavier and the rains more frequent the accumulation ceases. Cold water, we have seen, dissolves at least three-fifths of the guano in the state in which it reaches us. A single day of English rain would dissolve out and carry into the sea a considerable portion of one of the largest accumulations; a single year of English weather would cause many of them entirely to disappear.

When the recent guano falls it gradually dries and undergoes a partial decomposition. When it is again moistened by an unusual dew, or by an accession of spray driven by the wind, it again suffers a further partial decomposition, till at length it has given off, as the ancient red guano appears to have done, from five-sixths to nine-tenths of all the organic matter it originally contained. Mr. Winterfeldt states that this ancient guano is found buried beneath layers of sand; and Iquique is mentioned as one of the spots where the guano occurs. At this place, according to Mr. Darwin, the drift-sand climbs up the mountain-sides in great piles to the height of even a thousand feet. This, doubtless, is the sand beneath which the old droppings of the sea-fowl have been gradually buried; and to this ancient superficial covering it may be owing, that the buried masses still retain so much of their original organic matter. Even in that dry climate the time would at length arrive when the guano, long exposed to the agency of atmospheric causes, would retain only its earthy and non-volatile saline ingredients.

(To be continued.)

THE FALSE PRETENCES OF THE BANKS OF PREPARING TO PAY SPECIE, AGAIN EXPOSED.

From the Bank Reformer.

In the pamphlet on the "Abuses of the Banking System," and also at page 3 of the Bank Reformer, there were presented general statements, copied and digested from the official reports of the banks of Virginia, which showed, as clearly as facts and figures *could* show, the truth of what we had been continually setting forth, to wit: that the banks were *not preparing to resume specie payments*—nor even approaching the state of readiness to pay, by the only possible means of getting ready, which are, *reducing their loans and circulation, and increasing their specie.* The reports of the three principal banks of Virginia, and their branches, showing their condition on July 1, 1841, (published at page 3 of the Bank Reformer) showed that their condition was worse then than 6 months before. And the reports of January 1, 1842, just published, show that their condition, in comparative amounts of means and liabilities, continues much *worse* than on January 1, 1841, after another year of suspension, and of *pretending* to prepare to pay specie. The table below embraces only the three principal banks of Virginia and their branches. The reports of the small western banks have not been yet published. It is presumed however that these now presented, make at least as good an exhibit as the smaller banks, not here embraced.

The proportion of circulation to coin, in the said banks, in 1841 and 1842:

	Jan. 1, 1841.	Jan. 1, 1842.
Bank of Virginia,	$3.10 to $1 coin.	$3 38 to $1
Farmers' Bank,	3.34 to 1 "	3.50 to 1
Exchange Bank	2.53 to 1 "	2.90 to 1

From the above statements, made from official reports, it therefore appears that the three great banks of the state have, during 1841, (on an average,)

Increased their outstanding debts	$667.462 56
Increased their circulation,	380.983 33
Decreased their specie,	27.581 23

Nothing can possibly more plainly show, than these and earlier comparative statements which we have before published from the official reports of the banks made by their own officers, the inconceivable folly and stupidity of those persons who yet continue to believe that the extending the times of indulgence to suspended banks will have any effect in causing the banks to *prepare* to pay specie. Such stupidity in believers can only be equalled by the unblushing falsehood and knavery of those who *knowing the falsehood and absurdity* of such pretences, continue to urge the enactment of extended indulgence to bank suspension of payments, *as the proper and sufficient means of the banks' preparing to pay specie.* We have, for the last year, been telling the self-evident truth on this head, but it was to the ears of those who would not hear—and laying it before the eyes of those who would not see, even if the truth were as manifest as the noon-day sun. We have no hope now of inducing many to mark what we now again set before them, though it be taken from the reports of the banks themselves.

But though figures, in these condensations of statistical and official reports, show at a glance the general and important truth that we have tried so much and in vain to establish, there is no need to resort to such testimony, for the purpose of knowing that such *must* be the result, from the nature of things and the nature of man. The directors of banks, and those who most influence directors, have every operating inducement, of interest and feeling, to keep the banks *unprepared* to resume payment; and no inducement whatever to make preparation, save the mere cold and feeble dictates of right, justice, and moral obligation, even if these were not generally and entirely obscured and silenced, by the stronger promptings of interest and feeling. The greater number of bank directors, are also regular *borrowers*, and the *largest* borrowers from the banks. Though they take the lion's share of the loans, they cannot take *all*; and therefore, that they may get as much as possible for themselves, they are obliged to let other claimants be also supplied. Thus, while avarice urges them to continue expansion to supply their own wants, and, as an excuse for this, to supply the demands of other borrowers, the whole procedure is concealed under the plausable disguise of friendly sympathy for the wants of individuals, and of a public-spirited sustaining of the trade and business and general weal of the community. Again—to keep the banks totally unprepared to meet specie payments, and to keep the greatest number of debtors in the greatest possible danger of ruin, by sudden and heavy demands for payment, is the condition of things which serves precisely as the great and always unanswerable argument to the legislature to postpone for another year the resumption of payments—as resumption must always be disastrous to the banks and to their debtors, if commenced when totally unprepared for, either by the banks or by their debtors.

If, then, there were no other reason whatever operating on bank directors, and the borrowing class which control directors and banks, and all others who likewise desire the continuation of suspension, would they not certainly endeavor to maintain (as they do) the state of total *unfitness* of the banks to resume, as the sure means of obtaining further indulgence for continued non-payment? The idea that extending to the banks the time of indulgence of non-payment will alone serve to induce them to make preparation to pay, is so absurd and ridiculous, that no intelligent man, but a bank director, or a bank borrower, would have the hardihood to assert it, or to pretend to believe it *himself*, unless to convince an auditor deemed stupid enough to be imposed on by the grossest possible delusion.

In conclusion—we repeat, that if it be honestly desired by the legislature to compel the banks to return to specie payments, the only and the certain means will be to **STOP THEIR MAKING LOANS**, as well as declaring dividends. If this had been done in 1837, with a very slow and lenient curtailment of the existing debts, the banks would have resumed specie payments in two years at farthest, and might now be in as sound condition as the banks of South Carolina, which are all specie-paying, and in good credit. Even now, though nearly five years have been lost to this object, by foolishly or knavishly leaving it to fraudulent banks to stop their own legalized and profitable frauds, yet even now, if this policy were adopted, it would bring about specie payments in less than a year, and much sooner than any other legislative requisition and penalty whatever. And without thus stopping or greatly limiting of loans, the banks of Virginia *never will* pay specie, until forced into liquidation, or driven by general want of confidence into avowed bankruptcy.

IRISH POTATOES FROM SEED.

From the London Farmers' Magazine.

Squeeze the mucilaginous pulp with the seed out of the "apples" into a basin containing a weak solution of soda or common potash (lukewarm,) when on stirring the mixture, the mucilage will dissolve and allow the seeds to fall to the bottom; they may then be drained or strained out, and washed in clean tepid water—strained again, left to dry on a cloth, and hung up in paper bags to the kitchen ceiling till March, when they may be sowed in beds of light rich earth, prepared in the usual way for small seeds. The writer found it the best way to sow them in drills at one foot asunder, for the convenience of weeding, &c. They should not be sown thick; they will grow very freely. When the leaves and stalks are all withered (the early kinds will be months before others) they must be taken up and preserved in boxes of sand, or very light, dry earth, till the following spring, when they may be planted (whole) in small drills in the usual way, about 1½ or 2 in-

ches apart in the drills. With proper attention they will attain a good size; and when gathering, can be sorted and named according to fancy, as there will be a numerous variety. The earliest kinds, will be first withered, the later ones generally attain a larger size. W. C.

REMARKS ON THE AGRICULTURAL SOCIETY OF THE UNITED STATES.

To the Editor of the Farmers' Register.

February 9th, 1842.

In publishing the constitution of the "Agricultural Society of the United States" and a list of its officers, I perceive that, although you say "*you shall heartily rejoice*" if "*your anticipations and fears*" of its failure "*should prove to be unfounded*," you have added an argument against the plan, which, notwithstanding its brevity, will as certainly prevent such hearty rejoicing from ever taking place, as if you most anxiously desired to defeat the project altogether; that is, should this argument have the same effect on the minds of others which it has produced on your own. Indeed, I cannot even imagine any more effectual way fairly to kill any scheme which depends upon public opinion, than publicly to use the strongest reasons we can think of against it. Your argument, concise as it is, not only gives the substance of all the most plausible objections which have been urged against this society, but you have much increased its force by pronouncing the plan to be "*ambitious*." Now if this be true of the plan, it must be equally so of its authors; and must utterly condemn both in the minds of all who affix the same meaning to the term "*ambitious*" that I do.

It is at all times a matter of so much regret with me, where I find we differ in regard to any of the means for promoting the great cause to which we have both devoted ourselves, that I would never express such difference, unless urged to it by some motive much stronger than ordinary. True it is, that we have very generally concurred in our opinions relative to those means; and therefore it increases my present regret to perceive how widely we differ respecting the "Agricultural Society of the United States." But, connected as I am with that association, I feel it to be my duty to endeavor to refute the arguments which you have urged to prove that "it can not possibly *work right*." Your first objection is in the following words: "It cannot be expected that any considerable number of individuals, or enough to maintain even the semblance of a United States Agricultural Society, can be induced to travel to Washington, from all the states of the union." This objection would have some force, if any such expectation had been expressed, and its realization relied upon as essential to the maintenance of such society. But not having heard of any thing like it, I cannot believe it ever entered into the heads of any of the contrivers of this "ambitious plan," (if you will have it so,) that some members "*from all the states of the union*" must always attend, "*to maintain even the semblance of a United States Agricultural Society.*" Such attendance you call "*incredible sacrifices*;" but admitting the bare possibility of their being made, you ask, "what could be expected from their meeting, more than the usual and almost useless procedure of agricultural societies in general?" I will readily answer, not much more truly, if "*agricultural societies in general*" (of which we now have some hundreds, I believe,) were indeed the "almost useless" things which you here affirm that they are. But we have sanguine hopes that more, much more *may* and *will* be done; for we cannot discern the same difficulties that you see, in the way of its accomplishment. None of us deem it necessary to success that "*members from all the states of the union*" should attend, since we know that there are at least two large societies embracing all the states of our confederacy, which have been flourishing for many years, without any such general attendance. I mean the American Bible and Missionary Societies; not that I would compare these noble associations with ours in point of utility—far from it; but I mention them solely to prove that large societies, even more comprehensive than ours, may and do succeed to a very great degree, although but partially attended by their members. All that is necessary is, that there should be sufficient intelligence, zeal, and activity in a few to devise and direct their operations; and that funds enough should be contributed to accomplish such of their purposes as require money to achieve them. Such funds have always been collected by the societies referred to, without the personal attendance of more than a few, comparatively speaking, of their contributors, and they have also been applied in a way, not only to do great good, but to be approved by the absent as well as the attendant members. There cannot, therefore, be any reasonable doubt, but that our society might flourish in the same manner, and by similar means, even although its meetings were attended only by a small portion of its members compared with the whole number.

There is, however, a moral certainty that these meetings never will be small, if held, as we design to hold them, during the sessions of congress; for many of the members of that body are also members of the Agricultural Society of the United States; and it can hardly be doubted that numbers of persons from the adjoining states will also attend, more than enough altogether to carry on the business of the society quite as efficiently as any institutions of the kind in our country have carried on theirs. But time alone can prove whose anticipations are correct, yours or mine.

That such an agricultural society, as you imagine could possibly be formed in the District of Columbia, might be there established, I presume no one can doubt who has any knowledge of its citizens. But if these associations have so woefully failed, as you say they have, almost every where else in the United States, there surely is but little probability that one would do any better in or about the city of Washington. Admit, however, that it would, and that it succeeded far beyond any which has ever yet been established among us; there are certain things all-important to the general improvement of American husbandry, that no local society whatever could possibly achieve. These are, first, to form a body of husbandry for the whole union, by collecting and publishing all that is at present known and most approved throughout the different states, in every branch of rural affairs. This important duty will

be assigned to the vice-presidents of the society, and so far as I have any knowledge of the gentlemen already appointed, none are more capable of executing this duty well. A single report from each in regard to his own state would at once effect the object, after all were properly collated and arranged for publication; and annual reports afterwards would make public all the improvements which are constantly being made throughout our country, and which in no other way, probably, could so soon, (if at all,) become generally known to the whole body of the yeomanry of the United States. If the vice-president of any particular state should not possess all the requisite information, it is presumable that he could readily obtain it from the district and county societies which, I believe, are now established throughout the union, and whose members, in all probability, would take peculiar pleasure in furnishing it, when they knew the highly important and national purpose for which it was sought.

The second great object which our society will endeavor to accomplish, and which no local society can possibly effect, will be to ascertain, by fair and full trials, the comparative merits of all the most approved machines and implements used for the various purposes of husbandry; and then to make the results as public as possible. This would soon have the effect of checking, if it did not entirely stop the sale of the numerous "catch-penny" things, which their owners, at present, very often succeed in selling throughout our country, to the immense injury of ignorant purchasers; for the awards of such a society would, in all probability, be deemed the best attainable evidence of merit or demerit in all such articles, by every person who saw them for the first time, and of course could know nothing of their real value.

In the last place, such a society as ours, however partially attended, would certainly make our brethren, in the distant parts of our confederacy, sooner and far better acquainted with each other, than any other means that are at all likely to be resorted to; and would thereby contribute much towards strengthening those bonds of fraternity, the preservation of which is absolutely indispensable to the welfare and happiness of the United States: without those ties our union must prove nothing better than a "rope of sand."

These, my good sir, are my principal reasons for differing from you so entirely in regard to the Agricultural Society of the United States. They are the result of long and most deliberate reflection, made, too, many years ago, and before I had any the slightest expectation that such society ever would be formed, or that I should have any office in it. Of course, no "*esprit du corps*" has dictated them. Time alone (as I said before) can prove which of us is right—you or I. But of one thing I feel quite as certain as if it had actually happened. It is, that if your anticipations and fears should prove unfounded, however "heartily you may rejoice" at it, you cannot possibly do it more than will your old friend,

JAMES M. GARNETT.

[We were reluctant to express the opinions which are here censured by our highly esteemed friend and correspondent, and will not add a word of replication, nor say any thing in reference to the opposite views presented above. We will merely repeat, that we shall not only rejoice, but shall be ready to acknowledge our error, if the anticipations should prove false, which, being entertained, we thought truth and candor required us to express; and which were desired to be expressed in terms the most respectful, as truly felt, for the members of the society.

The application of the term "ambitious" to the plan of the society was by no means meant in an offensive sense, nor supposed obnoxious to any such construction. It was used merely in regard to the very wide ground and sphere of operations assumed by the society; and such ambition was noble and praiseworthy for its motives, even though the practical course might prove to be injudicious and inefficient.—ED. F. R.]

HINTS AND OBSERVATIONS.

For the Farmers' Register.

Raising of lambs.—Build a pen upon the plan of a pig pen. Leave a hole for the lambs to enter. Have a trough to put bran or meal in. It will be necessary for you first to catch the lambs, and put the bran in their mouths two or three times. They will learn to eat when five or six days old; and at the time (say 15 days old) when they generally die for the want of milk, they can live without the aid of the mother. I have had them to run in as readily as pigs.

All stock ought to be housed. They will make much more manure, and live upon about one half the food.

Sheep.—The Merino sheep, with a mixture of the long wool, is best for family use.

Cattle.—A small cow can live well upon long or short grass; but a large one cannot prosper upon short grass.

Tobacco, I think, is not as great an exhauster as corn, the roots running much deeper, and fewer near the surface.

Hemp is a very profitable crop. It will grow, upon good land, from 7 to 12 feet, and is considered an improver.

Flax is an exhauster, but a profitable crop. I have known, from two bushels sowing, between 30 and forty bushels seed made, worth $1.25 per bushel, and 330 pounds of flax from the swingle, worth 10 cents per pound.

The oat crop is considered injurious to sandy lands, but the clay soil seems to be benefited by it.

Buckwheat is considered a very uncertain crop, at times very productive, and a great exhauster of lands.

The turnip is considered a productive and beneficial crop, but the greatest exhauster of any thing sown upon the soil.

Grasses.—The herds-grass is better adapted to wet land, and also upon high sandy land, than any other I have tried.

Timothy will make the heaviest crop of any grass upon moist land, and grows well upon high manured land.

Orchard grass grows luxuriantly, and I consi-

der it the best grazing grass that I have ever seen.

Wheat sown out of season.—I sowed in my garden a peck of the Baltimore bearded wheat, about the first of April. There were a few indifferent heads in July or August. I let it remain. It lived over the whole summer, which was dry, and I cut it the next 4 h of July, as good wheat as you ever saw, but not so thick.

Prince William, Va. R. FOSTER.

COMMENTS ON ARTICLES ON BERKSHIRE HOGS.

To the Editor of the Farmers' Register.

I have thus far stood aloof from the controversy, which has been going on between the breeders of the different kinds of hogs, which they are anxious to put off upon the public. Perhaps I ought to pursue the same course still. But there are certain communications in your last (January) number, which I think ought not to be passed over without comment. And here let me assure your readers, that I do not undertake this thing in the spirit of controversy. I shall take sides with neither party. My sole object is to correct certain mis-statements or *mistakes*, if you choose, which, in my opinion, are calculated to mislead the public.

On p. 30, a writer, whose signature is R. S. B., uses the broad assertion, "that the Berkshires are not what they are cracked up to be." And in proof goes on to assert, "I have a neighbor who has given them a fair trial, to which I have been an eye-witness. The experiment was made in this way:—two Berkshires were placed in a stable with two of the common breed, all of the same age, and were carefully fed, and at the end of nine months were killed, and the result was, that the common breed exceeded the Berkshires in weight, one fifty and the other sixty pounds." Here it must be admitted, is a very formidable assertion. But without intending to impeach R. S. B's. candor, I must say that the trial was by no means "a fair one." Every one must have observed the difference in thrift of hogs of precisely the same breed. And even in the same litter of pigs, there is often the most striking difference, some growing off rapidly, whilst others are puny and weak and not worth raising. Now, in the present instance, all that we are told is, that the hogs were equal in numbers, equal in age, fed the same length of time and on the same food, and that at slaughtering the common hog greatly exceeded the Berkshire in weight. Now, without calling one of these facts in question, allow me to inquire, may not the increased weight of the common hog be accounted for, on some other principle than his superiority? Perhaps he may have been more healthy, and therefore more hearty; perhaps the Berkshires were stinted when young, a misfortune from which they never recover; or I can conceive twenty other *perhapses* on which I can account for the difference. But I have already alluded to a litter of pigs, in which there is no difference in breed, but still a great difference in thrift. Now, when R. S. B. will account for this difference, I will do the same in his case.

But R. S. B. presents another formidable objection to the Berkshires. "They are not prolific: a gentleman of my acquaintance had four sows, each of which had but *one pig*, being a loss of at least ten per cent. a head, and the generality of them, I believe, do not get more than four or five." This objection, I confess, somewhat surprises me. I really know not what to make of it. The Berkshires have hitherto been considered as *remarkable* for their prolific qualities, and my own observation has confirmed the fact. One of my boars got on a neighbor's sow fourteen pigs, on another nineteen, and on a third, twenty-two. And in my own case, my sows breeding from this and another boar, have so many pigs, that I am constantly subjected to the painful necessity of killing them, to prevent worse consequences. I have always thought a bet a very poor expedient to establish any fact. It only proves the sincerity and confidence of the party. And as this is what I have principally in view, I hereby offer R. S. B. not a *bet* but a *barter*, that for every Berkshire sow, young or old, he can find having but one pig, I will find twenty that have five or more; and for every full grown sow, that has only five, I will find fifty that have ten or more.

There is another communication in your last number, p. 12, signed Bolling Jones, which I think requires some notice, not that it contains any mis-statements or even mistakes, but because it makes a representation which is calculated to discourage the raising of pork among us. This gentleman's hogs, it seems, cost him $22.42½ when the same amount of pork might have been bought for $14.96. Here is evidently a great loss. But let me inquire, in my turn, what line of business, in all or any of the pursuits of life, is at all times exempt from losses? Would it be considered as wise in the merchant, the mechanic, the manufacturer, or any other person, to abandon a pursuit usually profitable, simply because he had met with a loss? On this plan all trades and pursuits would be subjected to fluctuations and changes, which would eventually destroy the whole. The fact is that the last pork season was a very unusual one. I cannot call to mind the time when pork was so cheap. A variety of concurrent causes served to depress this article to a degree never known before. If Mr. Jones could have bought it last year for $4, he knows that the usual price in his county has been $6 and sometimes more. If therefore pork had continued at its customary price, a price which it will in all probability recover again, there would have been no loss even in his case. And here let me remark, that the sure and direct mode to raise the price of pork, is to do just as this gentleman has done: abandon the raising of it himself, and discourage it as far as he can in others also. If this state of things become general, we shall soon be without hogs of our own, and then the Kentuckian will charge us just what he pleases for his.

But Mr. Jones, according to his own showing, has subjected himself to full twice the expense that there was any need for in raising his hogs. His hogs, it seems, in 15 months and 5 days, "each ate 37 bushels 1½ peck of corn." Now I affirm, and that too upon actual trials, amounting to many hundreds, that 11 bushels of corn, with such other food as every farm will produce, is sufficient to keep a hog in good thrift for the first

12 months of his life, and then to fatten him in the bargain. And this I say, not from the report of a servant, but, being my own hog-herd, I know it to be a fact. This subject has already been presented in detail by me, and published in the October number of the Southern Planter, to which I refer Mr. Jones and all others who may be curious about it. I would just remark, that his great error seems to be that he had corn, and scarcely any thing else for his hogs, and hence his great expense in rearing them.

But, Mr. Editor, before I leave this subject, I have a word to say to *you*, and this in fact was my chief reason for taking up my pen at this time. At the end of Mr. Mahard's communication, page 17, you have appended a note, in which you *seem* to discourage the strenuous efforts which are now in progress to improve our stock. I say *seem*, for I cannot believe that a man who has done so much for the improvement of the soil as you have, would designedly throw one single obstruction in the way of improving our stock. In this note "humbug, humbugging, humbug forever, deception" and such like, frequently occur, as connected with this subject. Now, although I am free to admit with you, that many impositions have been practised in this matter, yet I am by no means prepared to concede that *all* is humbug and deception. I believe that among those who have imported fine animals, with the view of propagating and selling them, are many as honest, as high-minded, and as much above the meanness of deception, as any class of men whatever. I will even go further, and say, that these United States owe to these men a debt of gratitude, which they will find it very difficult to extinguish. These, I doubt not, are your sentiments as much as they are mine. Why, then, allow me to ask, cast ridicule upon a whole class of men, when comparatively few deserve it? But, sir, improvements are certainly in progress, and no representations of humbuggery, by *implication* or in any other way, can possibly arrest them. Men will see for themselves, and when the fact is obvious, they will not allow it to be controverted. When I was a boy, my father had the good judgment and kindness to require me to hold the handles of the plough. But after I commenced my little education, I knew nothing practically of this implement for about 20 years. At the expiration of this period, it was my good fortune to return to the plough again. I only regret that I did not return much earlier. But when I came to my old acquaintance, I was literally astonished at the improvement which had been effected in it. Instead of that little unsteady thing which merely *scratched* the surface, I found a solid implement, which took a firm hold on the soil, and completely inverted the sod. With this practical evidence before my eyes, and in my hands, could I doubt that an improvement had taken place in the plough. In the same manner, some years ago our hogs were a long-snouted, lank-sided, long-legged, ugly beast, requiring two or three years to get their growth, and a poor affair even then. Now I see an animal compact in form, having a large proportion of body, with leg just enough to take the necessary exercise, but not enough to fit it for mischief, and giving me more meat, and better meat, in 12 or 18 months, than the old hog did in twice that time. And shall I not call this an improvement? *You*, sir, in your zeal to prevent imposition, may call this humbuggery; but I call it solid improvement.

Notwithstanding what I have said, I cheerfully acknowledge that the public has been sadly gulled on this subject. I doubt not that in some instances, when Brother Jonathan was hard run for a genuine pig, and strongly tempted by the $10 jingling in his hearing, he was prevailed on, *just this one time*, to send a [low] grade pig. In other instances, when there has been honesty enough to send the genuine, the inferior have been selected for this purpose, whilst the best have been kept at home. These are the cases, sir, which you so justly and severely reprehend. But in the midst of all these spurious coins, there is certainly some genuine metal; and this is all that is contended for by your humble servant,

J. H. TURNER.

QUERIES IN REGARD TO PREVALENT DISEASES PRODUCED BY LOCAL CAUSES.

The following queries were drawn up at first for the consideration of the Board of Agriculture. But they were not offered by the writer, because he deemed it injudicious, at the outset, that the subjects of inquiry should be more extensive than those actually adopted by the Board. But there is no subject, not strictly belonging to practical husbandry, which has a closer relation to the interests of agriculturists, through a large part of Virginia, than the investigation of the sources of malaria, and its effects, and, by ascertaining facts, to discover any means for the prevention or mitigation of this scourge and destroyer. To invite attention to the investigation, and the furnishing of accurately observed facts, these queries are here submitted in their original form, to serve merely as suggestions. Nearly all men of observation and experience who reside in lower and middle Virginia, though knowing nothing of medical science, have by observation learned facts which would throw some light on this dark subject; and still more could be done by country physicians possessing also equal means for observation. Any accurate facts furnished on this subject we would gladly publish; and whether few or many, they will, according to their extent, form useful materials for future and more extended labors of the Board of Agriculture. We have long been convinced, and have stated the grounds of the conviction, that much of the production of the baleful effects of malaria may be prevented by a proper system of agriculture, aided and enforced by legislative enactments and strict police; and that such a system would be profitable of itself directly, and ten-fold more profitable indirectly, as serving to

lessen the losses and pain and unhappiness produced by disease and death.—Ed. F. R.

1. Is your region or neighborhood subjected to autumnal fevers, (the effects of malaria,) or any other diseases produced by local causes—and to what extent and degree, in general?

2. What are the supposed local causes or particular sources of malaria, and their comparative injurious power—as rapid rivers and smaller streams sometimes overflowing the bordering low-lands, tide-water marshes, salt or fresh, swamps, mill-ponds, and the passage of floods from mill-ponds, at uncertain and irregular times, over salt tide marshes?

3. Have diseases from such causes increased or diminished in frequency or virulence within any certain past time, and if so, to what circumstances are the changes ascribed?

4. Can the lessening or removal of malaria and its effects be effected by the action of the residents, either operating alone, or necessarily requiring new legislation, or general police, in regard to drainage, mill-ponds, removal of nuisances, &c.?

5. In illustration, and as proof, state particularly any known facts, and the authority on which they rest, which serve to confirm the opinions expressed in answer to the preceding queries.

RECEIPT FOR MAKING SOAP.

From the Massachusetts Ploughman.

Mr. Buckminster:—I am not quite satisfied with your explanation and recipe for making soft soap. This article is a compound of potash and tallow, or grease, which union is formed in conformity with the laws of chemical affinity, and in different proportions. Whenever they are brought together in these proportions, so that their respective particles come into uniform contact, unless some counteracting substance is mingled with them, the union is inevitable and its result good soap. In order that these particles may be brought into complete and uniform contact, agitation with water is necessary.

The quantity of water required, depends on the quality of soap you wish to produce. A barrel of soap may be three-fourths water. With this quantity and the proper proportions of potash and grease, it will be very good soap. It is however more commonly seven-eighths water, and sometimes reduced much more, and then, of course, it is very inferior in quality, not that it will not do its office, and do it as well, but it does less. If this process be so simple and its result so inevitable, your correspondent wishes to know why any person who attempts it has "bad luck" and fails. There are several causes of this. A very common one is that either the potash or grease is in excess.

The former ought always to be so to some extent, to make the soap effective for cleansing whatever it may be applied to. That part of the potash which is in excess is always ready to combine with any substance which is brought into contact with it, for which it has an affinity. For animal fat of all kinds this affinity is very strong, and more or less so for all kinds of animal matter, as washwomen, who have used that which has too much uncombined potash, have often found out by its effect upon their hands. Cloth made of wool, or part wool, will be ruined by it—the affinity of potash and wool being such, that a very good soft soap can be made of them.

On the other hand, if the grease is in excess the soap is good for nothing; the alkali in the compound being already surcharged with grease, has no power for removing dirt, stains, &c.—while the uncombined grease defiles whatever it is applied to. As before remarked, for the ordinary purposes, for which this kind of soap is wanted, the potash should be in excess. If it is too much so, however, the soap, as the saying is, "will not come"—nor will it if the grease is so in the slightest degree. If either of these causes is operating to prevent its "coming," the best way to ascertain it is by touching the soap to the tongue. If the potash predominates to an extent sufficient to prevent the soap from coming into work, its effect upon that organ will be rather severe. If the potash is not felt at all, more lie must be added. But, as I have before intimated, there are other causes of failure besides these two. A very small portion of common, or any other kind of salt, or of any kind of acid, will prevent the combination desired. The former unites with the water, forms a brine and settles to the bottom, and on being permitted to cool, will leave a greater or less thickness at the top of an inferior kind of hard soap; according to the greater or less amount of grease used. Acid will unite with the potash—make a brine of the water which will settle to the bottom, and if there is enough of it in leave the clear grease at the top.

There is generally some salt in family grease unless it has been boiled upon water. Sulphate of lime or magnesia is in some wells so abundant as to render it impossible to make good soft soap with the water. The sulphuric acid of these substances having a stronger affinity for potash than for these, leaves the latter, unites with the former, and forms a salt called sulphate of potash, which being dissolved in the water forms a brine and settles to the bottom.

Again, carbonic acid, (a gas,) which is constantly floating in the air, has a strong affinity for potash, and when united with it forms a salt (pearl-ash) which will prevent soft soap from "coming." This union is constantly going on with the potash, even before it is leached from the ashes, so that if they are very old, so much of this kind of salt is formed that unless it is in some way removed, soap cannot be made of the lie. For the same reason old potash, which is on the outside of the lump, where the air has come into contact with it, will be pretty sure to disappoint the expectation of the soapmaker. This difficulty, which always occurs to a greater or less extent, must be removed, and for this purpose (not, as you seem to intimate, for "its strength") lime is used, it having a stronger affinity for carbonic acid than potash has. Consequently when they are brought into contact, the acid leaves the potash—combines with the lime and forms an insoluble substance called carbonate of lime, and is simply pulverized limestone. There are other difficulties in the way of making this kind of soap in Boston and vicinity. Coal ashes produce no potash. The same is the fact with turf or peat

ashes. Nor have the ashes of rotten and decayed wood any of this substance in them, while that which has been soaked in sea water has a portion of salt among its ashes.

One word by the way of a recipe or process in conformity with these facts.

In preparing the ashes for leaching about one peck of unslaked lime, after being slaked and completely pulverized, should be mingled and equally mixed with three bushels of good ashes, damped enough to prevent dust from rising. In this way, as you will perceive, the lime and potash come into close contact with each other, as soon as the latter is drawn from the ashes by the water which is applied for leaching them, and therefore the acid has the best possible opportunity for coming in contact and uniting with it. Lime placed at the bottom of the leach, by itself alone and unmixed with the ashes, will do the lie a great deal of good by attracting much of its acid, as it passes through, though much less than when mingled with the ashes throughout equally. Placing it upon the top of the leach is almost useless. Water can dissolve only about 1.500 part of its weight of lime; and only that lime which is dissolved while the leaching water is passing through it comes at all into contact with the potash. To put lime into the soap is much worse than useless.

Nor am I quite satisfied with your leach tub. It should be perfectly tight, with but one hole in the bottom for drawing off the lie and that as carefully stopped as your cider barrel until your lie is fit to draw off. A board with a dozen inch holes bored through it, resting upon bricks edgewise and covered half an inch thick with shavings makes a good bottom for a leach tub.

The ashes when put in should be crowded and trodden completely together, leaving about three inches of space at the top of the tub for receiving the water.

After filling in water until the ashes will take no more, it should be permitted to stand 4 or 5 hours to allow the lime an opportunity for combining with the carbonic acid. The lie is then to be drawn off, and so much of it as is under the false bottom, or between that and the ashes, should be again put upon the top of the leach, that by a second passage through the leach it may be made perfectly caustic.

Your mode of testing the strength of the lie is as good as any, unless an instrument called an alkalimeter is at hand. Lie thus made, if not too strong or too weak, will be certain to combine with the grease as soon as the mixture is warm enough to melt the grease, provided it is moderately stirred, and provided the grease is pure. This may be made certain by boiling it a few minutes with half its weight of water, and afterwards letting it stand long enough for the water to subside. With 25 pounds of such grease you may be sure of an excellent barrel of soap. SOAP BOILER.

Newton, Feb. 2, 1842.

POWDER OF SLIPPERY ELM.

From the United States Gazette.

We live but to learn and obtain knowledge. Being in the country a few days since, on a visit to a sick friend, I was shown an article entirely new to me, which is said to be remarkably nutritious and palatable for debilitated and sick persons. It was flour, prepared by the Shakers from slippery elm, and used the same as arrow-root. One table-spoonful of this flour, boiled in a pint of new milk, is excellent to feed infants weaned from the breast. They will not only fatten upon it, but it will prevent bowel complaints. It makes an easy and nutritious diet for consumptive and dyspeptic persons. From the character I received of it, I presume that it only need be known to become of general use.

DRIVING CATTLE.

I have often witnessed the infliction of cruelties on dumb beasts accused of sullenness, by persons attempting to lead or drive an animal alone. This subject was brought to mind so forcibly a few days since, by a neighbor sending a boy to lead a a heifer a distance of several miles, by a rope attached to her horns and nose, that I determined to write a line upon it. The restiveness of cattle, in such cases, is caused by skittishness. The remedy is simple and efficient. Fasten a board before the face, in the usual manner of blinding breachy* cattle, and the wildest cow or heifer may be led or driven with perfect ease.—*Maine Cultivator.*

AN ESSAY ON THE SYSTEM OF AGRICULTURE BEST ADAPTED TO KENTUCKY.

By Adam Beatty, of Mason county, Ky.

[To this essay was awarded the premium offered by the Agricultural Society of Kentucky.]

In adopting a system of agriculture best suited to the circumstances of our state, regard must be had to its variety of soil and climate. The climate of Kentucky extends from thirty-six and a half to thirty-nine degrees of north latitude. So far as regards climate, every part of the state is well adapted to the culture of Indian corn; but wheat can be grown to advantage only in the more northern parts. Indeed, even in those parts best adapted to wheat, this useful grain, except for our own immediate supply, is not found to be a very profitable crop. The new states to the north and west, in the cheapness of their lands and better adaptation to wheat from climate and soil, will always have great advantages over our state in supplying the New Orleans market. The culture of that article to any considerable extent, in Kentucky, will, in the general, be found not to be useful or advantageous, and ought, except to the extent of supplying our own wants, to be left to such of our farmers as occupy a soil not adapted to hemp and tobacco. Besides the uncertainty of the wheat crop in the rich vegetable soils of Kentucky,† it is very exhausting, and requires much

* In New England cattle are called "breachy" which break through fences.

† Liebig says, that soils particularly rich in humus are not favorable to the growth of wheat.—*Organic Chemistry*, p. 197-8.

attention to manuring and grassing of land to prevent its deterioration.

Barley is better adapted to our soil and climate, is not so exhausting, and may, in those parts of the state where there is a demand for it, be cultivated to more advantage than wheat.

In the rich vegetable soils of Kentucky, which are well adapted to the growth of hemp and tobacco, these crops, together with the necessary grains for feeding stock, such as corn, rye and oats, and the appropriate vegetables for the same purpose, should be the principal objects of culture.

Tobacco can be grown to advantage in every part of the state where the soil is suitable, but it is more peculiarly adapted to the Green River country, where the climate is better suited to the production of a first rate article.

A system of agriculture best suited to our circumstances, whilst it should embrace every variety of product, to which our soil and climate is adapted, should be so diversified as to appropriate lands of various qualities and lying in various latitudes, to the production of those articles which are best adapted to the nature of the soil and most suitable to the surrounding circumstances.

Thus lands lying near a large town or city, where the facilities for obtaining manure are very great, may be advantageously applied to the production of such articles as will serve for the consumption of the place.

By directing our efforts to the production of as great a variety of articles as the nature of our soil and climate and other circumstances will justify, we shall obtain all the advantages resulting from a division of labor, and at the same time guard against the consequences of *over production*.

If the whole energies of our state were directed to the culture of tobacco, there would not only be a misapplication of labor in attempting to produce that article in lands unsuited to the crop, but there would be an *over production*, and consequently a considerable diminution of price. If a like effort should be made to extend the culture of hemp, a similar consequence would result; and so in relation to any other agricultural product. Still greater evils would result if we were to direct all our efforts to the raising of live stock. The consequence would not only be the usual result of *a supply exceeding the demand*, but there would be a *surplus* left on hand, which would have to be fed and sustained in the hope of a *future demand* at some distant but uncertain period.

But although our agricultural efforts should be directed to as great a variety of products as circumstances will admit of, yet the *same individual* ought not to attempt the culture of too great a number of articles. In general farmers will succeed better by directing their *main efforts* to some one crop as an article for sale, and such others as are necessary to feed their stock and furnish subsistence for their families.

In one particular our system of agriculture should be uniform. Whatever may be the nature of the crops we cultivate, the utmost care should be taken so to cultivate our lands as never to suffer them to become less fertile.

Although there has been considerable improvement in our system of agriculture within the last twenty years, yet there can be no doubt we are still far behind the improvements of the age in the highly useful science of agriculture.

The extreme natural fertility of our best lands induced our early settlers to fall into the error, that it would be impossible to exhaust them. The great depth of the vegetable mould and a most excellent subsoil founded upon limestone rock, very naturally induced the opinion that it was inexhaustible. Experience has shown the fallacy of this idea, but is difficult even at this day, to make the generality of farmers sensible of the extent of deterioration which much of our naturally rich soil has already undergone; and still more difficult to convince them of the great advantages which would result from such a change of our system of husbandry as will restore our exhausted soil to its original state of fertility.

A *continued* cause of deterioration must ultimately terminate in such a reduction of soil as will render the product of less value than the labor necessary to bring it to maturity. Such a course of cultivation not only diminishes the profit of the farmer each succeeding year, until his profit is reduced to nothing, but his capital vested in land will be almost entirely sunk.

The least reflection will satisfy any one of the disadvantage of such a system. It costs no more labor to cultivate an acre of ground producing sixty bushels of corn than would be required to cultivate the same acre after it has been so reduced in fertility as to produce only thirty bushels. Now if the agriculturist who raises thirty bushels of corn per acre is barely paid for the labor expended in raising it, it is evident that the additional thirty bushels which it would have produced if the soil had not been suffered to diminish in fertility, would have been clear gain.

The same would be equally true of hemp, tobacco, and every other crop, except the small additional labor of harvesting the increased crop and preparing it for market after it has been brought to maturity.

As land can be much more easily *kept* in good heart and fertile condition than it can be *restored* after it has been deteriorated, a discreet farmer will always resort to the *easier* method, especially as it is by far the *most profitable one*.

If we take from land all or nearly all that it produces, and restore nothing, we gradually abstract from it those nourishing principles, which are essential to the growth of plants; and when the work of destruction has been carried to a certain extent, there will no longer remain in the soil a sufficient quantity of nourishing ingredients to produce a crop sufficient to pay for its cultivation. If a beneficent Providence had not made provision for a supply to a considerable extent of those elementary principles which constitute in various states of combination, the appropriate food of plants over and above what is furnished by the soil, our best lands under a bad state of cultivation would long since have been reduced to a state of complete sterility. In a state of nature every thing is restored to the soil which is drawn from it by the growth of plants, and hence it continually increases in fertility. To preserve the fertility of land while in a state of *cultivation*, it is only necessary to restore to the soil such a proportion of the fertilizing ingredients as will, together with those furnished from the atmosphere, be equivalent to the sum of those drawn from the soil by the growing crops.

pact heaps, so as to expose as little surface as possible to the falling rain; to this end the manure collected in cow yards, feeding pens, &c., should occasionally be thrown into heaps in the form of a stack, mingling therewith, during the process, a due proportion of gypsum. A still further precaution might be used, by removing the manure, as soon as it is in a fit condition, to the fields for which it is destined, and there spread. This would check any remaining disposition to ferment, and the falling rains would carry the ammonia down into the soil, with which it would combine, and thus all danger of further loss, to any considerable extent, would be avoided. From what has been said, it will be seen that manure is liable to great loss during the process of fermentation, unless the utmost care is used to prevent the escape of ammonia. If manure is suffered to undergo complete decomposition, there will be a considerable saving of labor in hauling and spreading, and much less difficulty in ploughing the ground on which it is distributed, but there will be more or less loss of some of the most valuable ingredients of the manure. If the proper precautions are used to prevent the escape of ammonia, perhaps upon the whole, it will be found most advantageous to suffer the manure to undergo at least a partial decomposition, before it is removed to the fields for which it is intended. But, notwithstanding every precaution that can be used in preserving and applying putrescent manures, some loss will be sustained. Ammonia readily enters into combination with carbonic acid, forming a volatile compound, and is itself, while in a gaseous form, with all its volatile compounds, extremely soluble in water.* And hence every particle of water evaporating from a dung heap will carry with it ammonia and carbonic acid, unless they shall have been converted into a salt, which is not volatile. Alumina (clay) exercises an indirect influence on vegetation, by its power of attracting and retaining water and ammonia."† Liebig informs us, that "a part only of the carbonate of ammonia which is conveyed by rain to the soil is received by plants, because a certain part of it is volatilized with the vapor of water." But if the soil contains a due proportion of gypsum, or when deficient in this respect, if it should be supplied from time to time with gypsum, "the carbonate of ammonia, contained in rain water," (and of course that which is carried down into the soil by rains, falling on putrescent manures) "is decomposed by gypsum, in precisely the same manner as in the manufacture of sal-ammoniac. Soluble sulphate of ammonia and carbonate of lime are formed; and this salt of ammonia, possessing no volatility, is consequently retained in the soil. All the gypsum gradually disappears, but its action upon the carbonate of ammonia continues as long as a trace of it exists."‡ It will be observed from the reasoning of Liebig, that the ammonia which the soil receives during the decomposition of long manure, which may be left or spread on the ground, is also liable to sustain a loss by combining with water and passing off in the form of vapor. But as in this case, the process of fermentation is very slow, the carbonate of ammonia will have more time to combine with the soil, and the roots of plants are constantly engaged in absorbing it. During slow fermentation there is probably but little loss of carbonate of ammonia, even when gypsum is not present, and when present none at all.

So far, therefore, as the products of the soil, which are not useful for the consumption of man or beast, can be left on the ground, that will be the most economical application of manure. In this mode of applying it, the labor of transporting and distributing it will be saved, and much less loss will be sustained by evaporation than where the decomposition is rapid, and no gypsum used. Thus it will be advantageous to leave upon the ground as much of the stubble of wheat, rye, &c., as can be left consistently with an economical saving of the grain. With the same view corn stalks may be left on the ground and ploughed in. The straw of rye and oats, fed off to stock, and of the second crop of clover when fully ripe, will also be of great advantage to the soil. All these will undergo slow fermentation, and if not suffered to be washed away by heavy rains from rolling lands, will add much carbonate of ammonia and some potash to the soil. Liebig informs us, that "ammonia, evolved from manure, is imbibed by the soil, either in solution in water, or in the gaseous form, and plants thus receive a *larger supply of nitrogen* than is afforded them by the atmosphere."* Indian corn, as well as rye and oats, is sometimes fed off by turning stock in the field. In this mode of feeding the whole product of the soil is restored, and the land must necessarily be enriched, in proportion to the quantity of nourishing ingredients, which the growing crop received from the atmosphere, (always a large proportion,) with such abatement only as will be equal to the loss of ammonia, sustained by evaporation.

In the remarks I have hitherto made on manures, I have not referred to one species, which Liebig considers of very great value, I allude to human excrements. This subject is treated very much at large, in the work to which I have so often referred, but it would extend this essay to too great a length to go fully into an examination of this very important ingredient. A few extracts will be sufficient to show its importance. At p. 242 he remarks, "that if we admit that the liquid and solid excrements of man, amount on an average to 1½ lbs. daily, (5-4 lb. urine and ¼ lb. fæces,) and that both taken together contain 3 per cent. of nitrogen, then in one year they will amount to 547 lbs. which contain 16.41 lbs. of nitrogen, a quantity sufficient to yield the nitrogen of 800 lbs. of wheat, rye, oats, or of 900 lbs. of barley."

"This (he observes) is much more than is necessary to add to an acre of land, in order to obtain with the assistance of nitrogen absorbed from the atmosphere, the richest possible crop every year. Every town and farm might thus supply itself with the manure, which besides containing the most nitrogen, contains also the most *phosphates*; and if an alternation of crops were adopted, they would be most abundant. By using at the same time, bones and the lixiviated ashes of wood, the excrements of animals might

* Liebig's Organic Chemistry, p. 130. † Ib. 191. ‡ Ib. 141, 142.

* Liebig's Organic Chemistry, 141.

be completely dispensed with." At page 246 he says "that with every pound of urine a pound of wheat might be produced."

At page 241-2 he states that liquid animal excrements, such as the urine with which the solid excrements are impregnated, contain the greatest part of their ammonia in the state of salts, in a form, therefore, in which it has completely lost its volatility; when presented in this condition, not the smallest portion of ammonia is lost to plants, it is all dissolved by water and imbibed by their roots."

I will quote but one more passage which goes to show the great superiority of human manure over that of other animals. "In respect to the quantity of nitrogen contained in excrements, 100 parts of the urine of a healthy man are equal to 1300 parts of the fresh dung of a horse, according to the analysis of *Macair* and *Marcet*, and to 600 parts of those of a cow."

Ashes of wood and vegetable substances from which potash is derived, is also a very important manure. "Most plants, perhaps all of them contain organic acids of very different composition and properties, all of which are in combination with bases, such as potash, soda, lime or magnesia."* Without alkaline bases, Liebig says, "most plants could not exist." And it is a remarkable fact that where there is a want of the usual alkaline base in a soil, suitable to a particular plant, another alkaline base will be substituted.† This fact shows the indispensable necessity of an alkaline base in all plants. If further proof were wanting the fact that all trees and plants contain more or less of the alkaline bases would be perfectly satisfactory. Some trees require much less alkali than others. Thus pines and fir trees require a much smaller quantity of the alkaline bases than other species. And consequently the former thrive well on a soil where the latter could not exist.‡ One hundred parts of wheat straw yield 15.5 parts of ashes; the same quantity of the dry stalks of barley 8.54 parts; and of oats straw only 4.42. The ashes of all these are of the same composition."§ The facts here stated, prove that wheat is much more exhausting of this particular manure than barley or oats.

Of such great value are ashes esteemed in Germany, that they are transported, as Liebig informs us, "from the distance of 18 or 24 miles." They are particularly valuable to meadows, as these are constantly drained of their potash by the annual removal of the crops of hay—a crop containing a large portion of that ingredient.

It is obvious that if a soil contain only a limited quantity of potash, it must in time be entirely exhausted, if the growing crops are annually removed, and no part of the product is restored, unless a supply is derived from some other source.

The atmosphere furnishes a small quantity, but by no means sufficient to replenish the waste occasioned by the growing crops, and hence the necessity of making up the deficiency by the application of ashes and other manures, containing potash.

Liebig relates an extraordinary instance of the effects of depriving a soil of its potash, which occurred in the vicinity of Göttingen. A proprietor of land, "in order to obtain potash, planted his whole land with wormwood, the ashes of which are well known to contain a large portion of the carbonate of that alkali. The consequence was that he rendered his land quite incapable of bearing grain for many years, in consequence of having entirely deprived the soil of its potash."*

Liebig says, "it is the greatest possible mistake to suppose that the temporary diminution of fertility in soil is owing to the loss of humus; it is the mere consequence of the exhaustion of the alkalies."† He states a variety of facts to corroborate this opinion. When we reflect that the principal ingredient, furnished by humus to the growing plants, is carbon in the form of carbonic acid, and that plants derive a very abundant supply of this element, *after* the formation of their leaves from the atmosphere, by means of their absorbing power, we cannot but regard the opinion that the diminution of fertility in soils is more owing to the loss of alkalies than humus, as at least very plausible. Liebig is of opinion that the great diminution in the fertility of the soil in Virginia, since its first settlement, is owing to the exhaustion of its alkalies. He estimates that "from every acre of this land, there were removed in the space of one hundred years 1200 lbs. of alkalies in leaves, grain and straw; it became unfruitful therefore because it was deprived of every particle of alkali which had been reduced to a soluble state; and because that which was rendered soluble again in the space of one year, was not sufficient to satisfy the demands of the plants."†

Silicate of potash is an ingredient of indispensable necessity to the vigorous growth of the small grains, and of all plants of the grass kind. Ashes is the source whence it is derived, and hence the importance of saving and applying this manure to our cultivated land, and particularly to that which is appropriated to meadows and raising of wheat. Ashes which have not been lixiviated are of the greatest value, as a manure, but after having undergone that process, they still contain silicate of potash, and salts of phosphoric acid, and consequently are of great importance as a succor to all plants of the grass kind.‡

Phosphoric acid is also a very important ingredient, particularly for the small grains. It is found in the ashes of all plants, "and always in combination with alkalies and alkaline earths." "The seeds of corn (wheat) could not be formed without the phosphate of magnesia, which is one of their invariable constituents."§

I cannot quit this subject without recommending to every agriculturist, a diligent study of Liebig's very able work an agricultural chemistry, and particularly that part of it which treats of manures, and the means of preserving the fertility of soils.

Although the manuring of lands, if proper care be taken in collecting, preserving and distributing them, will do much towards preserving their fertility, and renovating such as have been deteriorated by bad husbandry, yet other means can be resorted to, with great advantage in has-

* Liebig's Organic Chemistry, 148. † Ib. 149. ‡ Ib. 198. § Ib. 199.

* Liebig's Organic Chemistry, 161. † Ib. 196. ‡ Ib. 228. § Ib. 200, 201.

The office of the soil is, "1. To receive and digest the food designed for the growing plant. 2. To serve as a medium for conveying to the spongiolets or mouths of the plants the water holding in solution the different substances which pass into and nourish them; and, 3. To serve as a basis for fixing the roots of the plants, and maintaining them in an upright position."*

The following are the most important elementary principles, which, in various states of combination enter into the composition of vegetable matter, and furnish the appropriate food for growing plants; oxygen, hydrogen, nitrogen and carbon, together with a small portion of the alkalies and oxides of various metals. So far as these elementary principles are supplied from other sources than the soil in which crops are grown, the waste occasioned by their removal is replenished. Plants possess the power of decomposing water,† and appropriating its elements by assimilation as food; and as water is composed of hydrogen and oxygen, it follows that two of the foregoing elements are derived in large quantities from the atmosphere through the medium of rain, snow and dews.

Liebig, in various parts of his able work on organic chemistry, has shown that plants derive from the atmosphere, by the absorbing power of their leaves, a large and regular supply of carbon in the form of carbonic acid. He adds that during the heat of summer, (a plant) derives its carbon exclusively from the atmosphere."‡

Here then we have the source whence is derived in large quantities three of the principal elements, which in various states of combination assist in furnishing food for growing crops. Nitrogen is known to be essential to the healthy and vigorous growth of plants. This element exists in large quantities in all animal substances, and also to a considerable extent in decaying vegetable matters, but much of it escapes in the form of ammonia during the process of decomposition. It was difficult until recently to account for the manner in which the loss (sustained by soils while in cultivation) of this indispensable ingredient of fertility, is replenished. Liebig has shown in a very satisfactory manner that ammonia (composed of three parts, by weight, of hydrogen, and 14 parts nitrogen) is combined with rain water and snow in small quantities, and hence the loss of nitrogen sustained by the removal of crops from the soil on which they grew is, in a limited degree, restored by the falling of rain and snow. Thus nitrogen, to some extent, is also supplied by the atmosphere to growing plants; but as this supply is not so abundant as that of the other elements, the utmost care should be used by the cultivators of the soil to keep their lands well supplied with this indispensable ingredient of fertility, by taking nothing from the land but what is necessary, by restoring in the form of manure every thing that can be restored, and by cultivating clover and other ameliorating crops which take but little from the soil, while they add to it all the fertilizing ingredients which they derive from the atmosphere. When these circumstances are duly considered we may readily account for the length of time during which a soil may be cultivated in the worst possible manner, without entirely exhausting it. A continued effort is made by nature to replenish the earth with those fertilizing ingredients which have been inconsiderately wasted by the improvidence of man, without any effectual effort on his part to restore even the small proportion of those ingredients which would furnish a full supply of food for future crops.

When a beneficent Providence has done so much towards restoring the elementary principles constituting the food of plants, which, to a certain extent, must be consumed by the growing crops, a strong encouragement is held out to the industrious farmer to do his part also. In looking around he beholds every where the evidence that when all is restored to the earth which grew upon it, a continued increase of fertility results. This is a sure indication that a beneficent Providence intended that the earth should never become sterile by cultivation—it plainly points out to man that he too should restore to the soil that portion of its products for which he has no use. He should continually bear in mind that the aids, provided by a bountiful Creator, were only intended to supply the *unavoidable loss* of nourishing ingredients or food for plants, occasioned by the necessity of taking from the soil a portion of the growing crops for consumption, and which cannot, therefore, be fully restored. While, therefore, the prudent farmer may confidently rely upon these aids in preserving the fertility of his soil, he will recollect that he must also do his part. He may take for consumption the fruits of the earth for both man and beast, and yet give back to it enough to keep up its original fertility, by restoring only a reasonable proportion of that part of its product which remains after consuming all that is of any value for food for himself and provender for his stock.

Next to oxygen, hydrogen, carbon and nitrogen, the alkalies, potash and soda, constitute the most important ingredients, in the food of plants. These were formerly considered as simple substances, but were ascertained, by Sir Humphry Davy, to be metallic bases, combined with oxygen. They are therefore real oxides. They are capable of combining with a great variety of substances; and, in various states of combination, form an indispensable food for plants of almost every kind. Hence if these substances were entirely extracted from the earth, it could no longer produce a vigorous growth of those plants which require a supply of these alkalies as a part of their food.

Liebig has shown, that these alkalies exist in a state of combination with water, in small proportions, and that where they have been extracted from the soil by growing plants, they may be restored by irrigation, and by rain.* Sea water also contains these alkalies in small quantities, and Liebig informs us that "the roots of plants are constantly engaged in collecting from the rain those alkalies, which formed part of the sea-water, and also those of the water of springs, which penetrates the soil." That, "without alkalies and alkaline bases most plants could not exist."†

The alkaline earths, lime and magnesia, are

* Farmers' Companion, p, 50.
† Liebig's Organic Chemistry, 122.
‡ Liebig's Organic Chemistry, p. 106. See also p. 54 and 55.

* Liebig's Organic Chemistry, 159, 160.
† See further on this subject, p. 196 to 200.

necessary to the vigorous growth of some of the most valuable agricultural products. These earths exist in great abundance, in some soils, but in others are very deficient, particularly in lime. This deficiency is, in some degree, supplied from the atmosphere. Liebig informs us that "by the continual evaporation of the sea, its salts are spread over the whole face of the earth; and being subsequently carried down by the rain, furnish to the vegetation those salts necessary to its existence. This is the origin of the salts found in the ashes of plants, *in those cases* where the soil could not have yielded them."* Besides a small quantity of *sulphate* of lime, there is contained in sea-water, according to Liebig, 1.12400 of its weight of *carbonate* of lime.

Thus it is seen we are indebted to the atmosphere not only for oxygen, hydrogen, carbon, and nitrogen, but also for potash, soda, and the alkaline earths—lime and magnesia. The importance of these will be further noticed, when I come to remark upon manures.

The means of preserving the fertility of the soil, and renovating that which has been partially exhaused are,

1. A judicious rotation of crops.
2. The saving and applying of manures.
3. A liberal cultivation of such crops as receive their chief nourishment from the atmosphere.
4. Good tillage.

As a distinct premium has been offered for the best essay on the rotation of crops best suited to Kentucky, I do not propose, in this essay, to say any thing on that branch of the subject.

The saving and applying of manures is very important to a good system of husbandry. And great care should be taken to preserve so much of the product of the farm, as is left unconsumed by man and beast in suitable situations, to be used at the proper time, for that purpose.

The necessity for suitable application of manure, to cultivated lands, is very evident when we reflect, that some of the most important ingredients which serve as food for plants, such as nitrogen, potash and soda, are furnished but sparingly from the atmosphere. These ingredients are all found in manures; and by properly saving and applying them, the farmer is enabled to make up the deficiency of the supply from the atmosphere. Manures contain also other useful ingredients, which, perhaps, can be derived from no other source.

A question of great importance, and one which seems not yet to be fully settled, is what is the best manner of preserving manure till the proper period of applying it to the land in cultivation, and in what condition should it be applied, whether after complete decomposition has taken place, or when only partially decomposed or in the state in which it came from the earth? Liebig, in his able work on organic chemistry, in its application to agriculture and physiology, has shown that ammonia is a very important ingredient, in the nourishment of all agricultural products.

During the decomposition of manures, a large quantity of ammonia is formed, but being a gaseous substance the whole passes off, and is entirely lost. If, therefore, long manure is exposed in heaps to the effects of heat and moisture, fermentation ensues, and the consequent formation of ammonia, which passes off in the form of gas, and nothing is left, as he informs us, but "a mere carbonaceous residue of decayed plants." An idea of the loss sutained by manure, exposed to heat and moisture, may be proved by the fact stated by Liebig, "that with every pound of ammonia which evaporates, a loss of sixty pounds of corn (wheat) is sustained." To prevent this loss Liebig recommends "that the floors of our stables, from time to time, be strewed with common gypsum, (sulphate of lime,) the ammonia (he says) enters into combination with the sulphuric acid, and the carbonic acid with the lime, forming compounds which are not volatile, and consequently destitute of smell."*

Growing plants receive large supplies of oxygen and hydrogen (the component parts of water) from rains and dews. They are also supplied abundantly with carbon, in the form of carbonic acid, by means of the absorbing power of their leaves. But a full supply of nitrogen and the alkalies is likewise essential to their vigorous growth. These are more sparingly supplied from the atmosphere, and hence the importance of additional supplies. Putrescent manures abound in nitrogen, but this important element of vegetable food, during the process of putrefaction, nearly all escapes (if no measures are taken to fix it) in the form of ammonia.

Liebig has shown, that this may be done by a proper application of gypsum to stable manure before the fermentating process commences.† A similar application of gypsum to manure, saved in feeding pens, cow yards, &c., would, no doubt, have a most beneficial effect, but it must be remembered, that ammonia is readily absorbed by water, and consequently large portions of it may be lost, where the manure is so exposed as to become satured with that fluid. Every precaution, consistently with a due regard to economy, should be used to prevent this. Placing the manure under sheds, and intermingling with it a due proportion of gypsum, would be the most effectual way to guard againt the loss of ammonia. But in general this would be attended with too much expense. The next best method is to so place the manure, preparatory to its undergoing fermentation, as not to subject it to the drainage of the adjacent grounds, or the dripping of water from the roofs of stables, cow sheds, &c. The former object can be attained by a judicious selection of suitable ground for feeding yards, and by cutting ditches where necessary, to carry off the water. The latter may be secured by erecting stables, sheds, &c., so as to have the manure thrown out at the gable end, where there can be no dripping from the roof. Where stables or sheds have been already erected upon a different plan, the drippings from the roof may be carried off by leading troughs. These precautions would leave the manure subject only to the effects of rain falling immediately upon it. To guard against this, the manure should be kept in com-

* Liebig's Organic Chemistry, 166.

According to Marcet, sea-water contains in 1000 parts:

26.660 chloride of sodium. 4.660 sulphate of soda. 1.232 chloride of potassium. 5.152 chloride of magnesium. 1.5 sulphate of lime.

* Liebig's Organic Chemistry, 239. † Ib. 239.

tening the process. A judicious system of grassing our lands which can be accomplished with but little labor, will always be found very useful, and must enter largely into our system of agriculture.

Red clover, there can be no doubt, is the best adapted to this purpose. In consequence of its thick growth, and its numerous and broad leaves, it is well suited to draw nourishment from the atmosphere; and does so, perhaps, in a greater degree than any other grass, except other species of the trifolium. Red clover is one of the tribe of leguminous plants, which "are remarkable on account of the small quantity of alkalies or salts in general, which they contain."* The *medicago sativa* (lucerne) according to Liebig contains less than one per cent. (0.83) and red clover probably does not contain more. Hence one great advantage in the cultivation of this crop will be that it requires to sustain its growth but a very small portion of alkali, while it will absorb from the atmosphere not only that ingredient, but also nitrogen in the form of ammonia, and will thus add to the soil two very important ingredients that enter into the constituents of the food of plants. When we take into consideration, that nitrogen and the alkalies are indispensably necessary to the growth of plants, and that these substances are very sparingly supplied from the atmosphere, we will perceive the great importance of the clover crop in restoring and preserving the fertility of soils. Besides, this crop will furnish fine pasturage in the early part of the year, when other grasses are too short for that purpose. After being fed off by stock, whose manure is left on the ground, it produces a luxuriant second crop, which may either be fed off in the fall, or left as a coat of manure upon the ground. This may be repeated two or three years in succession, as circumstances may require. The last crop, when fully ripe, should be ploughed under in the fall of the year, and will thus furnish a coat of manure for the succeeding crop. If ploughed under when green, the operation will necessarily have to take place during warm weather, and consequently a rapid decomposition and escape of ammonia would ensue. This should always be avoided.

Blue grass is also valuable in restoring the fertility of land, but the process is more slow, and should only be resorted to in lands intended for cultivation, where they can be conveniently left in grass some eight or ten years.

Rye is a crop that exhausts but moderately when the grain is reaped; and when fed off by stock upon the ground on which it grew, is a rapid restorer of soil which has not been much exhausted. It is attended with the advantage of producing two crops from a single sowing, the second always springing from the seed left on the ground by the grazing stock.

The liberal cultivation of grasses and rye—to be fed off by stock—coupled with a judicious rotation of crops, will undoubtedly have a powerful effect in restoring the partially exhausted lands of Kentucky, but a judicious system of manuring, as recommended in this essay, would greatly add to the rapidity of the process, and should by no means be neglected, especially when lands have been considerably deteriorated by bad husbandry.

Little need be said to show the necessity of good tillage in any tolerable system of agriculture. If land be carelessly cultivated, weeds not only draw from the growing crops a portion of the nourishment, which ought to have gone to their sustenance, but they also tend to diminish its fertility. Besides, air is essentially necessary to the growth of plants, so much so that Liebig informs us that "without oxygen, neither seeds nor roots can be developed." If the soil be kept light, and finely pulverized, it greatly increases its capacity for absorbing air and moisture. And as "plants during their life constantly possess the power of absorbing by their roots, moisture, and along with it, air and carbonic acid,"* it follows, that "by loosening the soil which surrounds young plants, we favor the access of air, and the formation of carbonic acid; and on the other hand, the quantity of their food is diminished by every difficulty which opposes the renewal of air."†

Thus, by a careful and diligent cultivation of land, the crop is furnished more abundantly with its appropriate food, is kept free from the contaminating influence of weeds, is furnished with a due quantity of air, and is not obstructed in its growth by the baked earth with which careless cultivation leaves it hampered. And in addition to the advantages resulting to land, the diligent husbandman is rewarded with a greatly increased crop, and the prospect of being relieved from much labor in future, by exterminating all noxious weeds from his arable grounds.

Liebig affirms that "the agriculture of China is the most perfect in the world," and *there no weeds are suffered to grow.*

If, by any, it should be thought I have been too minute in describing the elementary principles constituting the food of plants, I rest my justification in the opinion expressed by Liebig, that "any great improvement in that most important of all arts (agriculture) is inconceivable without a deeper and more perfect acquaintance with the substances which nourish plants, and with the sources, whence they are derived."‡

The judgment of Liebig will doubtless be a sufficient apology, unless we are content to be still subject to the reproach that "agriculture has hitherto never sought aid from chemical principles, based on the knowledge of those substances which plants extract from the soil on which they grow, and of those restored to the soil by means of manure."§

A. BEATTY.

* Liebig's Organic Chemistry, 204.

* Liebig's Organic Chemistry, 83. † Ib. 106. ‡ Ib. 62. § Ib. 207-8.

BERKSHIRE HOGS.

From the Farmers' Cabinet.

An article in the last Cabinet, under the caption of Berkshires, and containing so very unfair a judgment on the merits of that invaluable breed, over the signature of R. S. B., Northampton county, together with the severe strictures of G. H. D., where the Berkshire mania, so called, is classed with the humbugs of the day, seem to make it proper for their friends, if they have any

left, to protest against their being thus unceremoniously killed off without benefit of clergy. Indeed, at this time, when, with the versatility peculiar to American character, the agricultural press is teeming with anti-Berkshire essays, condemning, in louder tones than ever were uttered in its favor, the whole breed, as a Merino sheep, multicaulis humbug, it might seem almost presumptuous, even in one who has tried them, to endeavor to stem the torrent. It seems unfortunate that, on the introduction of any thing new, either in agriculture, science, or the arts, in the thermometer of public opinion, the mercury, starting at zero, must rush up immediately and rapidly throughout its whole range, and all the way back to the starting point, and even below it before it finally attains its proper state of quiescence. Particularly on the introduction of a new breed of animals, we seize on them with great avidity from the mere novelty, invest them with extravagant and supernatural qualities, proclaim the wonderful things they *are to do*, and when at last they fall short of these calculations, the whole affair is pronounced a "Merino, multicaulis humbug." From being placed in the first instance far above their merits, they are next placed far below them. This, in the United States, is always the modus operandi of introducing new breeds of stock to farmers, who, after passing through the high fever stage of heavy profits, and down again to the cold or collapse, at last finally settle in a medium temperature, and give to the new breed whatever is its just value. To this process Berkshires must submit. R. S. B., in the communication referred to, does not make the true issue. He says one of his neighbors put up two Berkshires and two common hogs in a *stable* to feed, and that the common ones outweighed the others. This is very probable, but does not prove the main point, *that the Berkshires did not return the greatest weight for the quantity of food consumed.* Berkshire breeders do not contend that *generally* they attain such great weights as other hogs, but that a given amount of food will make a greater quantity of pork; that if it does not feed such large hogs, it will feed a greater number. I have so fully satisfied myself of this point, that, although owning some very fine ones of the Chester county breed, I have killed them off, and intend keeping nothing but the thorough-bred Berkshire. At about 12 months old they will weigh from 200 to 260 lbs., being ready for slaughter at any period of their growth, and requiring at last but a few days' feeding upon corn to harden the meat. The shape of the true Berkshire is perfect, forming the beau ideal of a perfect animal; the bone fine, the head and all the offal parts very small, the most valuable parts, the hams and shoulders, full, round and large. Occasionally it is admitted that they have not sufficient depth, but this is only an exception. Where it occurs, the owner must remedy it by careful selection. This cannot be made a valid objection, for there is no breed, however pure and perfect, of any animals, but that something must depend on the judgment and talent of the breeder to keep so, and to remedy any occasional or inherent defect. Something approaching the barrel form must of necessity accompany the quality of easy feeding. In regard to size, the farmers here who feed a few every fall for Philadelphia market, besides what is wanted for home consumption, find that a hog weighing from 150 to 250 lbs. is the most saleable and brings the best price. The Berkshires make just the weight wanted for family use. Whether in Northampton county, where grain is lower than here, they cannot *afford* to waste it on large consumers, which will carry to market greater weight and size, is for him to say. Another characteristic of the Berkshire is the superior quality of the meat. In this at least there is no mistake. Berkshire hams are well known in Philadelphia for their superior flavor and richness. They are remarkably free from fat, and are no less known by their handsome rotund shape, than by their tender and juicy qualities. A slice of Berkshire ham, properly cured, is a dainty morsel appreciated by a connoisseur. Another recommendation is the great fecundity of the breed, producing from 8 to 15 at a litter, and the fact of their being most excellent nurses. By a most unaccountable mistake, R. S. B. objects to them on this very head, and says they are not prolific, that four of his neighbor's sows had but one each, and that generally they have but four or five. I have raised Berkshires for several years, have sold numbers of them, not only in this neighborhood, but to gentlemen at a distance, and as far as my experience and observation go, would say they are not more noted for their *black* color than for their success in safely rearing a full average number.

The true question then at issue, at least in this section of country, is, *what breed of hogs will return the greatest weight for the quantity of food consumed.* Here lies the profit more than in the individual weight. A small, well-made animal may bring more money to the farmer, than one of twice his size, from the difference in the fattening property. It is generally admitted that very large animals are not profitable. They may do to grace the columns of a paper, and gratify those who have a penchant that way, without regard to the expensive process, but they will not suit the common farmer. I once was seized with this desire to feed a large hog; I purchased of a breed well known for attaining immense weights, but was completely cured. It weighed between five and six hundred, and consumed as much food as I am since satisfied would have fattened double the weight of Berkshires. It is a satisfaction to the early friends of the Berkshires, to observe that public opinion in respect to them has passed through the collapse state; that wherever the pure breed exists, prejudices even against color are rapidly dying away; and that they are slowly but surely creeping into favor, and earning the emphatic appellation of the farmer's hog. One thing undoubtedly which has retarded and still retards their reputation is the vast number which, since they were first introduced, have been palmed off as genuine Berkshires, having very little if any of that blood. The cause of this is to be found in the high prices at which they were sold, $30 and $40 per pair, and the absurd rule for testing purity, that they must be precisely of a certain shade of color, having so many white feet, and so many white hairs in the tail; thus inviting imposture, and inducing persons, wherever they could obtain these marks, which often appertain to a half or three-quarter blood, as well as to the full blood, to pass them for genuine Berkshires. A cross

for the purposes of speculation has, no doubt often been founded on very inferior stock. The true Berkshires have thus been made to bear not only their own burdens, but have been charged with the sins of a whole herd of worthless mongrels. However breeds may be denoted by certain external marks, either of color or shape, no rule for all cases can be invariably established: there will occasionally be exceptions. Durham cows generally run into light colors, and it is more absurd to say that Berkshire pigs are or are not pure on account of their feet or tail, than to condemn a Durham cow which happened to be of a red color, or had a dark nose. P. M.

East Bradford, Chester Co., Pa.

MURRAIN IN CATTLE.

From the Farmers' Cabinet.

We have sad accounts from England respecting the fatal disease which is carrying off their cattle by hundreds, and think that Mr. A. B. Allen did wisely in abstaining for the present from bringing over any horned cattle. It is said the veterinary surgeons term the disease the bloody murrain, and consider it infectious: now I know not how this can be, for amongst the very many cases that I have witnessed, I have never been able to convince myself of that fact. It is true that to a casual observer it may have the appearance of being so, for the cattle in a large pasture, or even in a whole parish or hundred, will oftentimes be attacked by it, and the disorder will spread abroad like a contagious fever, but I have no doubt the evil arises from a disordered state of the digestive organs, brought on by an unwholesome state of the atmosphere, or by feeding on unhealthy pastures, those low, cold and damp meadows, infested by aquatic plants, which, being taken into the stomach, become putrid and indigestible; and thus that noisome and putrid disease is engendered. For I have known one half the cattle upon a certain farm to be carried off by it, while not a single case has occurred on the immediately adjoining estate, but on the next farm again to that, the whole herd has been swept away; and just so have I observed the produce of their pasture lands to vary from dry, sweet and healthy herbage, to that which is long, moist, sour and unwholesome. And I am inclined to believe that the murrain in cattle, like the botts in horses, may be considered an *effect*, rather than a *cause*, both disorders arising, perhaps, from an unhealthy state of digestion, by which is engendered a disease, which, although it must be termed epidemic, might not be by any means infectious; indeed I well remember a dairy of fine cows which was thinned to less than one-half its original number, where the individuals were attacked by the disease on being confined to their winter quarters, the occupants of stalls 1, 3, 4, 6, 8, 10, &c., being carried off, while the intermediate numbers escaped uninjured, and remained in perfect health.

But to many persons it will no doubt seem strange to consider the origin of two disorders, so very different in their appearance, symptoms and effects, as the botts and murrain, as arising from the same cause, namely, indigestion, but as I conceive that they are engendered by a disordered state of the stomach caused by sour and unwholesome food, and that they might both be cured, or which is better, be *prevented*, by timely administration of a medicine, alkaline in its nature, I believe that reason will bear me out in the conclusion to which I am partly led by perusing an article on this subject in the Cabinet, vol. 4, p. 177, where it is said—quoting from the American Farmer—"Some years since I purchased a horse, but he had the appearance of laboring under disease; I commenced a course of treatment which I had before pursued in cases similar to appearance, but without effect; I was therefore induced to try the use of *lime*, as I was confident he was filled with botts, for he had discharged several; I therefore commenced by giving him a table-spoonful of slacked lime three times a week in bran mashes. After pursuing this course near two weeks, the botts began to pass away in quantities, varying from ten to twenty, which he would expel from his intestines during the night; in the mean time his appetite began to improve, and in six weeks he was one of the finest geldings I ever saw; from that day to this I have kept up the use of lime amongst my horses with decided benefit; and as an evidence of its good effects, I have not lost a horse since I began to use it. And lime is a certain preventive in keeping cattle from taking the murrain. As an evidence of this fact, I have used it among my cattle three times a week, mixed with salt, for three or four years, and in that time I have not lost a single animal by this disease; but in the mean time some of my neighbors have lost nearly all the cattle they owned. But I will give a stronger case than even the one above mentioned. One of my neighbors who lost all his cattle, had a friend living within two hundred yards of him, who had several cattle which ran daily with those that died, and his cattle all escaped—he informed me that he made it an invariable rule to give his cattle salt and lime *every morning*. I have, therefore, no doubt but salt and lime are a sure and infallible remedy for botts in horses and murrain in cattle."

And I am reminded of a circumstance by a friend, who has often before mentioned it; he had two fields of pasture near his house—on one of these he spread lime upon the turf to the amount of more than 200 bushels per acre, but as the other field lay immediately below his cattle-yard, from whence he had formed drains to carry the water over its surface in the most complete manner, he determined to let that suffice for a dressing; and the effect of the highly impregnated water from the yard was a growth of grass truly astonishing. Both fields were kept in pasture, and when the stock had eaten one of them down, they were removed to the other, and so changed regularly about; but the effect of the different crops on the appearance of the stock, horses and cattle, is not to be expressed, for while feeding on the limed land their coats were close, shining and healthy, and their spirits light and cheerful, even when they were compelled to labor hard to obtain a bellyful; but when turned into the watered grass, six inches or more in height, a difference for the worse could be perceived in 24 hours, and every day after they lost condition amidst the greatest abundance, with coats rough and staring,

lax in the bowels and flaccid, with distended paunches, dejected countenances, and sluggish in their movements; they soon exhibited a depreciation in value to the amount of about half their former worth. But the transition to health and vigor and good looks was quite as sudden and apparent on a return to the limed land; for again in 24 hours, or by the time the food had passed through the system, a change, particularly in their air and carriage, was very perceptible. My friend adds, he never had an instance of the murrain or botts while his stock fed on these pastures, but is satisfied he should have had both, but for the change to the limed land; for while feeding on the watered pasture, the stock had always the appearance of a predisposition to that state of derangement of the digestive system, by which he has no doubt these diseases are engendered.

In conclusion, I would ask, is it not quite fair to draw the following deduction from what has been said, namely, that all dairy pastures ought to be heavily limed, it being the most natural thing in the world to suppose that a proper secretion of milk, the best and most wholesome, depends very much on the nature of the food with which the animals are fed? and must not the butter from a cow that is in health and spirits be of better flavor, color and consistence, than that from one that is lax, washy and weak, from feeding on watery, acid and soft herbage? and will not this account for much of the disgustingly rancid, ill-flavored and ill-looking butter which we so often find in the market? My friend above quoted, and who is now at my elbow, answers "Yes; for while my cows fed on the watered meadow, the butter was scarcely eatable—white, soft and ill-flavored, but it was sweet, firm and fine-flavored when they were confined to the limed land." Ergo, lime your pastures, and allow your stock as much salt as they will consume daily, for I am convinced that lime and salt are a remedy for "botts in horses," as well as the "murrain in cattle." VIR.

REMARKS UPON ENGLISH CATTLE, AND A COMPARISON OF THEM WITH AMERICAN.

From the Kentucky Farmer.

It has become a matter of great importance to the American stock-breeders, to know now whether they can make any further improvements in their domestic animals, and if so, how, when and where. It would require too long an essay to be read before this society, to attempt to go over the whole circle of British domestic animals. I shall, therefore, in this paper, after an incidental paragraph, confine my remarks to neat stock alone, which at present probably most interests Kentucky.

I was not only at the annual meeting of the Royal Agricultural Society, but present also at that of Yorkshire, which was much superior in its show over the former, in horses, short horns, long wool sheep, and swine. I also privately examined the stock of many of the most distinguished breeders in Great Britain, and am free to declare, that, a few South Devon sheep excepted, we want scarce any thing more from abroad for years. Our roadsters and horses of all work, are superior to those of England, in shape, action and endurance—our cattle nearly as good. With fine wool sheep she has nothing to compare with us, and our splendid herds of swine, improved by the late importations, are now made quite equal to any.

Short-horns.—Just before leaving for England last spring, I took a careful survey of Ohio and New York, and since my return have gone again over much of the same ground, together with the addition of a part of Kentucky; and this second look has only the more fully confirmed me in the judgment that I formed while abroad, that, the *best* of one breeder's herd alone excepted, the short-horns of America, are quite equal to those of Great Britain. I therefore do hope, till the choicest of these can be had at a reasonable rate, that our money may not be wasted abroad in the pride of further importations—more especially during these hard times, and under the consideration of the little that Europe is taking of our agricultural products in return. Short-horns bred here can now be purchased throughout the country, of as good a quality as abroad, for half the money that it would cost to get them from there. Let us appreciate then what we already possess, foster, cultivate and spread it—*free ourselves from the* THRALDOM of foreign opinions, and no longer be carried away by the fashion of the word—"*imported.*"

I found English breeders very slow to believe that their stock, brought over here, were made *better*, rather than *deteriorated* in the change. Such a thing they thought utterly impossible in poor ignorant America. But that a great and decided improvement has been made in it, when fallen into any thing like judicious hands, can be demonstrated even to the most purblind and prejudiced. Animals may be seen now coarse and somewhat lathy, imported a few years ago, the third descendants of which are fine, compact, and symmetrical; and others that, in England, were somewhat wanting in constitution, have here completely renovated themselves, and become strong and hardy. If asked to account for these things taking place, I should answer mainly, that our climate especially in the southwest, was better adapted than that of England for the production of neat stock; that our grasses were equally abundant and less watery, and consequently more nutritious; and that our breeders have *some little skill, judgment and taste* in these matters, as well as those abroad.

Herefords.—Though a large and rather a fine, noble looking animal, the Herefords, in comparison with the short-horns are coarse and heavy in the head and horn, with a gathering of thick flabby skin under the jowls, and considerable dewlap. Their loin is well spread, but from the hip bones to the rump they drop suddenly away, and point out like the small of an egg, they also thin off in the flank, and are not usually as well let down in the twist as could be wished. They do not mature as early as the short-horns, and disinterested men were uniform in declaring to me that it took a stronger soil and better grass to support them. This has been denied by the Hereford breeders, but I found the advocates of short-horns very desirous to make the trial by feeding them side by side, to see which should

give the most and best beef on an equal quantity of food.

The quality of the Hereford meat is claimed to be superior—this I doubt, compared to the best short-horns. They are not dairy stock—in what then consists their merits? It is answered the yoke, they make powerful working oxen. But do we want workers alone? and if we did, are we deficient in them? Let the clean-limbed, powerful, muscular, quick-stepping cattle on the hills of the north, the east, and west, answer these questions. And as to their color, I often see those of a beautiful red, with line backs and white faces and belly, in my various perambulations through the states, and have no doubt but they are the direct descendants of as good Herefords as ever graced old England, and long since imported into this country.

But all Herefords abroad are not red, with white faces, &c. Some of the choicest and best that I saw exhibited at the Royal Agricultural Show, and elsewhere, were pure white; others again light roan, with red-tipped ears. I eagerly asked from whence these colors came, as the Herefords are a cognate family of the Devons, which are a deep mahogany red. No satisfactory reply was ever given me. Can I be wrong then in inferring that it was from a short-horn cross, especially as I found the form of these lighter colored animals more nearly approaching that breed than Herefords usually do? If I am correct then in these surmises, where is the necessity of further importations? We can take short-horn crosses on the beautiful brockle face animals that we already possess in our country.

Devons.—The red cattle of the eastern states doubtless originated from the North Devons; and if as much pains had been taken in breeding them in America as in England, they would probably be now as beautiful and perfect. A few very fine late importations have been made of these animals, probably quite enough to satisfy the demand at present. I think them better adapted to the light dry soils of our country than any other breed, the Scotch highland cattle alone excepted.

The South Devons of the same deep mahogany color, I found much larger than those of the north, almost equal in size to the Herefords, and some of them with nearly the fine handling, the loin and quarter of the short-horn. The cows of this breed are not unfrequently very good milkers, giving not only a large quantity, but also that of a rich quality. The oxen are admirable in the yoke, and make excellent beef. To those who have good pastures, and like this style of animal, and cannot rest satisfied with a cross of the short-horns or the Devons already in the country, I would recommend a small importation. I subjoin the size of a bull 3 years and 4 months old, that I inspected among others. Height over the shoulders, 4 feet 10 inches; girth round the heart, 7 feet 9 inches; length from base of horn to end of rump 7 feet, 5 inches. I think he might have been fatted to weigh 13 or 1400 lbs. dead weight. A cow 7 years old, of the same breed, was but a trifle inferior in size.

Sussex.—It is contended by many, that it was from the Sussex cattle that the Devons and Herefords sprung, the former therefore and not the latter, as has been generally asserted, were the pure originals. Be this as it may, their color and general characteristics are much like the Devons, and their weight but a trifle inferior to Herefords, with rather a greater proportionable length of body. The finest specimens are very symmetrical in shape, with limbs clean and sinewy as those of a race horse. I am confident that this style of cattle would rather suit the taste of the south. They are only moderate milkers, but their beef is pronounced unexceptionable, as indeed will that of all well shaped animals be found, when properly fatted, and that are worked in the yoke somewhat, and do not mature till about 7 years old.

It was against this beautiful race, the herd of Mr. Selmes, that Earl Spencer showed his splendid drove of short-horns for a mere nominal wager. Of course the Earl won, but not quite so easily as was anticipated. These animals are attracting considerable notice just at present in England among the graziers.

Jerseys.—The cows of this breed have been much celebrated for the quantity and quality of their milk. No doubt much improvement has been made in them by careful selections, with reference to these particular properties, still a great deal is owing to their high feed on parsnips, a root cultivated in great quantities and perfection in the Isle of Jersey, but after considerable inquiry, I could not find that they excelled the average of our own good native stock in these particulars, when equally well fed. They are of medium size, with short, fine, clear, waxy turned up horns, long clean head, beautiful mild eyes, thin neck, fine limbs and shoulders; but their backs are sharp, and they carry a very light quarter, and bred in so mild and equable a climate, their constitution is delicate, and with so thin a skin, as to make them totally inappropriate to our climate, when the flies of summer would so torment them on the one hand; and the cold of winter pinch them on the other.

Ayrshires.—This is an inferic short-horn in miniature, and I candidly think has been greatly overrated. That it is an excellent cow both for the dairyman and butcher, in the particular district of Scotland that it inhabits, and fed upon their peculiar food, I do not doubt, but when they come to be transported to England, and especially to America, they have not fulfilled expectation in these points. They derived their principal good qualities from a cross of the short-horn bull, these animals we have now among us at a moderate price, and in great perfection, to those therefore, who wish for something like an Ayrshire, already acclimated to our hands, I recommend to save their money at home, and purchase snug short-horn bulls of a medium size, bred here from milking families, and then cross them upon the best native milkers at their hand, from these make the most approved selections, and so continue on, and in this way with a small comparative outlay, a superior race of animals may be grown up throughout our country, better adapted to our use, than any thing we can possibly import. Grade short-horns are abundant now, especially in the west, superior in form for the butcher and milking qualities, to any Ayrshires that it was my good fortune to meet with while abroad.

Red Galloway.—By the above I mean a deep formed, square, bright red cow, without horns, and of these I have seen as fine specimens on the

Jersey marshes opposite the city of New York, said to have been originally imported from Holland, as I believe exist in the world. They were kept there as dairy cows, for the purpose of supplying that city with milk, and had the size and nearly the perfection of form of a snug short-horn, were capital meat well fatted, and rather celebrated as deep milkers. This breed I look upon as particularly desirable, they never can injure any thing by goring with the horn, and wanting these excrescences, it takes away of course just so much offal, and, as I think, adds so much the more to their value.

Black Galloways.—These are essentially the same as the reds above described, existing in the Galloways and other districts of Scotland, and the North of England, but perhaps, as a grazing beast of a higher repute, and are brought up and fed in large numbers from Scotland throughout England. I should like to see an importation in a small way into America of this useful race of animals, for they are active, lively, kind, and quiet in disposition, and superadded to their good qualities of meat, are fair milkers. I have heard them called Highland, and black cattle, simply, as well as Kyloes, Aberdeens, Angus, Keillor, Humlies, &c. There is also another kind of black cattle with horns, that are something of the same quality as the Galloways of the high bleak hills of Scotland. The above are all that struck me as peculiarly valuable in British cattle, and in summing up, it will be seen that we already bountifully possess the elements of good husbandry. We now want to be better informed, what animals best suit the soil, food, and climate of particular sections of our wide extended country, and it is to this point that I would earnestly solicit the attention of breeders in their communications, when treating hereafter on this very important and interesting subject.

A. B. ALLEN.

To the Pres. Ky. State Ag. Soc.

From the Southern Agriculturist.

MANURING WITH SALT MARSH GRASS AND MUD, ON THE SEA ISLANDS OF SOUTH CAROLINA.

(Extract from a Report on Sea-Island Cotton.)

No portion of the state is so abundantly supplied with materials for enriching the land as the Sea-Islands. On many of them there is scarcely a plantation of which one or more creeks do not form part of its boundary. The quantity of salt grass, and of mud is therefore inexhaustible. If these were skilfully used, the complaint of failure in the crop, from sterility of the soil, would seldom be heard. Of the former, marsh is not only in every respect superior to the rush, (one of the varieties of the plant of the genus juncus,) but stands pre-eminent as a manure for cotton among vegetable substances. To realize its full value, it should be incorporated with the earth during the summer months—the earlier the better. After the working of the crop has been completed, a certain number of active men are set to work with suitable flats or boats. The cuttings of each day are taken to the field on the following day and immediately buried; or rather a little earth from the tops of the ridges are thrown upon the marsh, which, as the chops with the hoe are not made continuously along the entire line of the ridge, but intervals of six or eight inches of sward are left, is by this process only partially covered. The quantity for an acre is twenty piled cart-loads. If the land be very light, only sixteen loads are recommended, as the blue disease, where it is not sparingly used on such grounds, is likely to be generated, of an irregular season.

Of course on all soils favorable to the production of blue cotton, the application of marsh should be carefully avoided. By the rotting of this grass from exposure to the rains and heat of summer, according to the mode of piling it for future use so generally resorted to, one-third of its nutritious properties is lost by evaporation, and consequently, one-third of the labor and time expended in collecting it—a point which appears to be wholly disregarded by the planter—is uselessly expended. If twenty cart-loads, the amount in general necessary for one acre, be accurately ascertained but not then listed in, when the usual period for removing them arrives, it will be found, that about twelve loads constitute the entire bulk; further, that the growth of the crop will show, that the manure is comparatively of an inferior quality. The task in gathering marsh for each laborer per day is three piled cart-loads. With these data, let us compare the actual results of the two practices, of which winter listings is almost universal. Ten fellows in thirty days will cut but nine hundred loads, which, if buried in summer, will cover forty-five acres of ground. On the other hand, if the operation be postponed until February, the quantity will be reduced to about six hundred loads, or enough only for thirty acres: the gain therefore by the method recommended is equal to the labor of ten men for ten days. Added to this there are incidental advantages worthy of especial notice. At no period is less work done by negroes than during the season for gathering manures. All expedients hitherto adopted to secure a full day's labor have been easily defeated. This plan surmounts the difficulty, as far as responsibility and mutual checks can accomplish it. Every day three sets of workers are separately engaged in effecting a particular purpose—the burying of a certain amount of marsh in a given quantity of land. The listers look to the carters, and the latter to the cutters. By these means, unless the head cartman, who should be selected for his faithfulness, neglects his duty, one and a half acres daily are well manured. Supposing four carts to be steadily engaged in taking away the marsh, and four ordinary females in listing it, the expense of fertilizing the six tasks, or one and a half acres, will be the labor of eighteen hands, of whom three may be small boys, and four mules per day.

The objections to summer listings are, first, that they expose the ground to the action of the sun when its surface should be protected by shade; secondly, that they injure the pasturage; and thirdly, that on very light soils and low lands, where marsh is applied, certain diseases known by the appellations of "blue" and "flaggy" are liable to be produced. In reference to the first objection, it may be remarked, that the tops of the old beds, from the want of moisture, are usually bare. If the mode of taking from those parts of them only a small stock of earth in the manner already explained, be rigidly adhered to,

the injury from this source, if any so decidedly manifest is the benefit of the general practice, is too inconsiderable to be noticed. But it is denied that any pernicious consequences whatever ensue. If there exist for a brief season a partial denudation of a very small portion of the soil, the deposition of a large body of rich vegetable matter under its surface will soon start into existence, if the season be moist, a crop of grass, where the sheep at some period of the day may always be found. The pasture grounds are consequently improved, at least under the influence of marsh, where the proper precautions are regarded.

Whilst it is believed, that no adverse or irregular season has ever been known to produce blue cotton on lands assisted by rotted marsh listed in the winter, if this grass, where an undue quantity is used, be allowed to decompose under the sward by being buried in summer, that disease, in certain locations and under particular circumstances, educed by the weather, will occasionally show itself. The manure in the former state, having parted with most of its exciting properties, is at no time capable of exerting much power; but in reference to the latter, the excess of stimulus from a rapid fermentation during the season of the greatest heat and moisture, increased in proportion to the porosity and friability of the soil, deranges the functions of the plants, and ultimately perhaps destroys their procreative powers. This is the true reason why the lighter the land the greater the probability of danger from the application of marsh in summer. The remedy is obvious. On such soils use this substance more frugally, or with salt-mud, the great antidote to the "blue" poison. In addition to these suggestions, as alike applicable to low grounds, a resort to the spade is an essential auxiliary in preserving the health and arresting the flaggy disposition of the cotton plant.

All that has been advanced on the subject of putting marsh under the ground in summer, applies with greater force to the rush-grass. Its decomposition is slow, and as it contains less aliment than its co-assistant, from seven to eight cart-loads to the task are required. It is a very safe manure, and well suited to any soil. Pine straw is of little value except when well trampled by the cattle. In its crude state it should be put only on the highest and driest lands, as it ministers to the growing crop mainly by collecting and retaining moisture. In aid of this purpose, and to destroy the vermin of which pine-straw is the fruitful parent, the use of salt, at the rate of from one pint to a quart to the task row, will be found eminently beneficial.

Of salt-clay-mud it is not our design to speak at large. Although the best quality—that which has the largest proportion of marsh-roots, contains all the necessary ingredients of the most perfect soil, yet it is true that it gives but an inconsiderable growth to cotton. May not this arise from some circumstance connected with its application to the land? The usual practice is to gather it between hoeing and harvest for future removal, or, if then taken to the field, to allow it to lie there until January or February. In the latter event, the heaps themselves soon exhibit the highest evidence of having incurred a considerable loss, but for this, compensation is erroneously supposed to be made by the facility with which the parts are separated, caused by the exposure of the mud to atmospheric action. When thrown up in winter, it is immediately put in the ground. All its virtues are thereby retained; nevertheless, if the lumps be not thoroughly broken a large quantity of mud will yield but a small quantity of manure. *Ten cart-loads well pulverized are of more benefit, than fifteen loads carelessly chopped.* If the mud as soon as collected in summer be taken at once to the field, and there undergo the admitted tedious process of disintegration with the hoe, the chief benefits of the two plans might in a great degree be experienced. The labor of carting and of chopping, if at all, would only be slightly increased, as by this practice a much less quantity is necessary. In any field, which two years before had been in cotton, the lumps of mud will be found in the same state in which they had been put in the ground. The vegetable matter therefore which composed them, it is evident, did not exercise its full power, though to effect that was the design of the planter. How then was the crop assisted? Only by the saline and alkaline properties of the mud, and the small stock of nutriment given merely by the surface of the lumps. If to these benefits, the clay, an essential part of this substance, be made to mix with the soil, which can only be done by pulverization, and the marsh-roots, that ought to constitute one-half of every hoeful, be detached from the mass and cut into particles in order to facilitate their solubility, then, it may be said, that, as a manure for cotton, salt-clay-mud, in a series of years, will realize a greater profit than any other known substance. The neglect of these apparently trifling matters, is probably the reason, why this manure does not materially add to the growth of cotton. As it is of a cold nature, it is never advisable, except where the strength and natural warmth of the land will justify it, to use it alone. In connexion with cotton seed, at the rate of only two and a half bushels to the task, or of well rotted compost manure, one piled basket to the row, its benefit is perhaps duplicated.

EXTRACTS FROM THE SIXTH AGRICULTURAL MEETING AT THE STATE HOUSE.

From the New England Farmer.

Subject, Sheep husbandry. Mr. Fitch, of Sheffield, replied, that if the object is to get *wool*, the Merinos and Saxonies are best; but if *mutton* is wanted, the large, long-woolled are to be chosen. The Saxony is from the Merino. The object aimed at in Saxony was *fineness* of fleece. At present prices, the Merino is more profitable than the Saxony, taking weight of fleece and constitution both into the account. They produce *almost* twice as much. Saxonies will give a fleece of 2 1-4 lbs. which will bring 50 cents. A flock of 40 Merinos, in Connecticut, with which he is acquainted, gave 200 lbs. of wool, or 5 lbs. each, worth from 38 to 40 cents;—the same flock gave 40 lambs. The sheep have every attention and are well kept. Has himself taken 16 lbs. of wool from two Merino bucks. The Merino is more hardy than the Saxony—bears the winter better and requires less attention at the time of lambing. At birth the Merino lambs are clothed—while the

Saxony are almost naked. Fineness of wool is generally an indication of degeneracy—and fineness of hair on the human head indicates the same.

The fineness of Saxony wool has been produced by breeding in-and-in. This course brings degeneracy. These sheep require a close house and much care. The Merino will do well with much less attention. Thinks sheep manure good; and when properly littered they will make more from a given quantity of food than cattle. They improve fields more when feeding upon them.

Mr. Tidd, of New Braintree, asked whether Mr. Fitch had been speaking of *pure* Merinos.

Mr. Fitch. Yes. The Merino will give as much wool as *any other* sheep of the same weight. The expense of keeping is in proportion to *size* the *wool* is in proportion to surface. The solid contents of cylinders are as the cubes of their diameters: the surface is as the squares. So that if the sheep are of equal length and round, the smaller one will have the most surface in proportion to weight. [Let the diameter of one sheep be 2, and of another 3. The square of 2 is 4; its cube is 8. The square of 3 is 9—its cube is 27. The surfaces in these cases are as 4 to 9—while the bulk, weight, or solid contents is as 8 to 27,—showing that there is obviously good ground for Mr. F.'s conclusion, that a larger amount of sheep surface or wool ground can be maintained at the same expense on small sheep than on large ones.—*Reporter.*]

Wool on large sheep is generally looser than on small ones. The small have the most wool in proportion to size. Merino and native cross give good stock of fine constitution—better than Merino and Saxony cross.

Mr. Plunkett, of Pittsfield, said his experience is not much, but he thinks that sheep should be suited to the soil. Small ones are best for hills and short pastures, larger ones for rich pastures and meadows. He can make about as many pounds of fine wool as of coarse on the same quantity of feed. The raising of sheep has not been a very good business lately, owing to the low price of wool—but perhaps it has been as good as most other branches of farming. A cause of the low prices and of need of better protection, may be found in the following statistics.

The growth of wool in the United States is probably not less than forty millions of pounds. It may be assumed that one half of this amount is worked up in our manufacturing establishments.

The importance of this branch of agricultural industry is not only great considered of itself, but in its effect on the other branches of agricultural labor. If the farmers are driven from the wool growing business by low prices of wool, then the dairy and beef growing business will become depressed from over production of those great staples.

It is well known to the farming interest that at the present time the price of wool is very much depressed, and that our wool growers are generally desirous of getting out of that kind of farming; and it might be useful to inquire into all the causes that have tended to this depression.

By the compromise of the tariff question in 1832, all foreign wool costing at the place from whence imported less than eight cents per pound, was admitted free of duty. There was imported in the year ending Sept. 1832, 4,042,838 lbs.; out of this amount were exported 1,227, 959 lbs.; leaving less than three millions of lbs. to be consumed in this country.

The importation of wool has gradually increased since that time. In the year ending Sept. 30th, 1838, there was imported 6,968,365 lbs.; 6,551,128 of which were imported free of duty. In the year ending Sept. 30th, 1839, there was imported 7,824,548 lbs.; 7,398,519 of which were imported free of duty. Only 9,800 lbs. were exported during the same year. Mr. P. has not been able to ascertain the importation of wool in the years of 1840 and '41. We may, however, from known facts about the importation of wool, calculate the amount imported in the last year to exceed ten millions pounds; an amount equal to about one half of what is raised by our farmers in this country to be sold to the manufacturers.

Here we have a principal cause of the great depression of the price of wool at this time.

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Mr. Cole, Editor of the Farmer's Journal, has had experience with but few kinds; first had natives—next 7-8 Saxony. This flock gave fleeces of from 4 to 6 lbs. The Saxony, where he lived in Maine, was preferred to any other. The reports of the Agricultural Society of Kennebec county, Me., show that they prefer the South Downs to any others. Pastures for sheep should be high and dry. They do best in dry seasons. He has never seen them drink in summer. In winter they will drink oftener than cattle. Clover hay is good feed for them. Roots are excellent for them in winter, but they should not have many potatoes just before lambing; better then to give some grain. Evergreen boughs are often given and answer a good purpose in feeding. The manure is better than most other kinds. (L. Peters, Esq., of Westboro', inquired what kind of grain he would give.) Does not know whether corn or oats is to be preferred, but would grind in either case.

Mr. Moseley, of Westfield, has found the Johnswort poisonous and troublesome to sheep when he gives them salt, but not so when salt is withheld. Ten sheep, with him, require two tons of hay worth 24 dollars; can get 12 dollars worth of wool and 12 of lambs; and by throwing in the pasturing come out square:—that is the way farmers are getting rich. Their manure is good. * * * * * *

SCRAPS OF FARMERS' CONVERSATION.

Reported by the Editor.

Recently, though at different times, I met and conversed with three farmers, who, in remote situations and under very different circumstances, have made remarkable improvements by enriching land and improved cultivation, and have also reaped large profits from their improvements and farming in general. The subsequent comparing of some of the opinions expressed by these successful improvers, induced the belief that even a very imperfect statement of them, and some of

the particulars of their different practices, would furnish interesting matter for the consideration of others. As there was no intention of this at the times of conversation, and no notes made, it is very likely that mistake or forgetfulness may now cause some errors of statement. If so, I shall be glad to be corrected, and also to be fully informed in writing, for publication, on every part touched on. Should such be the result, even my misstatements by mistake may produce light, and render service heretofore withheld from agriculture. For two of these very intelligent and successful farmers (though long-continued and approving readers of the Farmers' Register) have never contributed, directly, a single line to the pages of this publication; and the third, though he has done much more in that way than most other subscribers, by furnishing several valuable communications, still has *not* communicated near as much of valuable facts ascertained, and observations made, as he might have done, from his abundant resources.

Mr. William Old's farm is in Powhatan, and forms part of a very remarkable strip of peculiar and good soil, which extends not only through that county, but also Nottoway and Goochland, and perhaps still farther. This strip was originally known as the "oak land," it not having a single pine among its forest growth. The strip varies in breadth from 5 to perhaps 15 miles, and was, before being cultivated, much richer land in general than the land on either side, or elsewhere in that region. After long cultivation and great exhaustion, and turning this land out of cultivation, it then throws up a growth of pines, a short-leaved kind, [and of course not the "old-field pine" of the tide-water region.] Mr. Old has a large body of this worn-out and now pine-covered land. But it is not of value for furnishing vegetable matter, as the acid pine lands are. The leaves there never cover the ground thickly, and seem to rot much faster than elsewhere. [This is an interesting confirmation of the doctrine of the antiseptic quality of *acid* soils. This soil not being acid, cannot preserve on it several successive crops of fallen pine leaves, as do acid soils.]

Mr. Old's singular two-field rotation of oats and tobacco, alternated continually, was described by one of his neighbors last year in the Farmers' Register, (p. 308, vol. ix.) The oats are suffered to fall and remain on the ground as manure for the succeeding crop of tobacco, and are found fully sufficient alone to maintain the high degree of fertility necessary for good tobacco crops. All the lots for tobacco are thus managed. Desiring to increase the crop of wheat, at one time this two-field rotation of the tobacco lots was changed to a three-field, of 1st, clover, 2d, tobacco, and 3d, wheat. But the frequent failures of wheat caused this plan to be subsequently changed to the previous oat and tobacco two-field rotation, which has been thus but lately restored. In these two rotations, and without other manure than the oats or the clover, (after the first enrichment of the land by other manure,) one part of the lots has been 17 years so cultivated, without deterioration of the land or its products. The land on which all this tobacco cropping is done, is of broad "creek flats," or low-grounds of smaller streams running into the Appomattox, (the farm does not extend to the river,) and the soil was originally very rich, though shallow. It was, as elsewhere, much impoverished by exhausting and injudicious cropping, before coming into Mr. Old's possession; but, as the result shows, is capable of being restored to fertility, fully and profitably, by self-manuring by its own growth, or by other putrescent manures applied.

Gypsum is used generally, and acts well on the high-land, once in each course of crops, which is the five-field rotation of 1, corn, 2, wheat, 3, clover, 4, wheat, (on fallow,) 5, clover. *On the originally poor parts gypsum has done no good.*

Mr. Old is altogether opposed to the practice of graduated ditching on hill-sides, generally through a farm, for the purpose of preventing the washing of the land. He uses some short ditches of this kind, on very favorable positions, and as merely a partial preventive. He has seen land thus treated, which the ditches alone spoiled more than all the washing could do in a century of other judicious cultivation; and which was far more disfigured and injured afterwards, by the water breaking over the banks, as it certainly will do, with all the care that can be used. Supposing even (what is far beyond the truth) that the best arranged and constructed ditches, *always kept in perfect order*, could effect their designed purpose, of carrying off the redundant rain-water, it would be impossible, by any farmer's care, to prevent accidental and unlooked-for stoppages, which would be first made known by turning out the water of a ditch, cutting a gully, breaking by the accumulated force across the next ditch and bank below, and increasing its track of devastation thence to the bottom of the descent. As an example of the insecurity of the system, he referred to one of the graduated ditches, (such as above-mentioned,) through his corn-field, which being short, and frequently under his eye, he had several times himself examined throughout its whole length, and with a hoe removed every commencing obstruction. This care was in addition to all general superintendence and repairing. Late in the year he found that the water had broken over, and had begun to cut a gully. The cause was, that the fodder not having been gathered on a part of the adjoining corn, as it decayed on the stalks the small light bits had been blown off by the wind, and some had fallen in the ditch. The first rain floated this light stuff along the ditch, until a straw or small root, or some such thing, caught and stopped a few bits, which served to stop more; and as the muddy water settled and filled the crevices, finally made a dam sufficient to throw out the water. Had this ditch been at the top of the hill, and several other ditches below, this slight cause would have broken every one, and with more and more damage at every successive breach.

The frequent and generally increasing disasters and failures of the wheat crop in the middle part of Virginia, Mr. Old is at a loss to give a reason for. If he had judged merely from his own land, he would have ascribed it to the use of gypsum, and its supposed power of attracting moisture to the soil, as well as otherwise giving increased succulence to the growth of wheat.

Mr. Old considers that all dry arable land, even though clayey or stiff, requires grazing, to trample and consolidate the soil. He does so once in every course, and keeps a large stock of cattle,

(from 90 to 100,) for the benefit of their manure, and their periodical grazing, more than for any thing else. Besides this temporary use of his clover fields, he has a large standing pasture. He does much of his winter manuring by moveable pens, changed every week. This is done throughout the winter, during all weather in which the land to be so manured is either dry or frozen. Corn-stalks are hauled in and scattered for food and litter of each pen the first half of the week, and straw the latter half; so that the stalks may be as much trodden as possible. The size of the pen, as well as its continuance, is suited to the number of cattle and the quality of litter, so as to properly manure the space inclosed. Bushes are sometimes used to shelter the pen somewhat from the cold winds, but not generally. This mode of manuring saves much hauling, and is in other respects deemed as profitable, as from the permanent farm-yard, where the cattle are kept during all wet weather.

Gen. Peter H. Steinbergen is a farmer, and still more largely a grazier, in Mason county, on the border of the Ohio. The great object of his cultivation and great means of profit is grass to feed and fatten cattle for market. His enriching his exhausted lands by *top-dressing* presents the most successful, as well as extensive practice, in that novel and as yet much doubted mode of applying putrescent manures. The practice of the graziers in that part of the country is to manure by littering and feeding in lots, changed as often as sufficiently covered, and also on grass land. Of course, the manure is necessarily applied to and remains on the surface, and its early benefits are given to the grass, and not only for that year but for as many after as the grass may continue good, or the general plan of cultivation may permit the field to remain free from the plough. But great as has been the improvement thus made on land previously reduced very low by exhausting tillage, Gen. Steinbergen is fully convinced of the truth, that the ability to enrich poor land by putrescent manures alone, depends on the land having been originally fertile.

Gen. Steinbergen, without estimating red clover lower than its universally admitted degree of value, thinks still more highly of greensward, [*poa pratensis*]; and the superiority he claims for the latter is not only as furnishing more palatable and nutritious food for cattle, but also as a much richer green manure to the land producing it than clover. On describing to him how the sandy lands of lower Virginia, after marling, became sprinkled with greensward, he said it was then in the very state when (to nurse this grass and obtain its rich benefits) tillage should be delayed as long as possible, and the land be subjected to grazing instead. He thinks that light land should be always grazed and trampled, at least one year before tillage—and stiff land designed for tillage should never be grazed.

Dr. Corbin Braxton cultivates the very sandy low-grounds of the Pamunkey, where he has made most extensive and profitable, as well as very remarkable improvements of product, by marling with the green-sand marl—which has both the fertilizing principles of green-sand and of calcareous matter combined. As his general results, and also a general description of the Pamunkey lands, have been already published at length, (at pp. 678 and 637, vol. 8, Farmers' Register,) they will not be repeated here. And hereafter will be added some additional observations on that most valuable body of manure, and its remarkable effects. Here will be given merely a few of less important matters of conversation, and answers to verbal inquiries, though generally on subjects then under the eyes of both parties.

The opinions of all three of these farmers concur fully in the absolute necessity of sometimes grazing light lands. They also agree in the certainty and profit of enriching by putrescent manure originally rich land—or, in Dr. Braxton's case, of poor sandy land after its being marled. He has found, by experience, that it is best to graze clover pretty heavily, but still leaving a cover of (say) ankle high, the year he fallows for wheat. These very light lands, so light as to be worthless for wheat without marl, when marled and with clover fallow become good wheat lands—the best crops yielding 20 bushels the acre. After corn, the wheat is very mean, and indeed scarcely worth sowing. The Hessian fly is sure to be very injurious to corn-field wheat. The best safeguard against this insect is to enrich the land and thereby to cause the wheat to out-grow the depredations of the fly.

Before marling, all the efforts made to enrich by putrescent manures availed but little. Though all these light low-grounds were supposed to have been originally rich, farm-yard manure served to do but little good, and the effects were very fleeting. Since marling [as on all other marled lands] precisely the reverse is the fact.

Dr. Braxton is about to try to have clover to succeed his corn crop, instead of wheat after corn (as usual) and clover after wheat. This would doubtless be a capital improvement, provided clover can be produced with certainty after corn. In answer to my objections stated, of the attempt being made, for several years, in experiments at Coggins Point, Dr. Braxton considers that the Pamunkey land becomes, by the use of its peculiar marl, so favorable to clover, that there will be no difficulty in having it after corn. After clover being once sown, and the land full of seed, it takes possession of it whenever it is without cultivation, as if the most natural product of the soil. He is opposed to fall or early winter ploughing of the land, when preparing for corn. Ploughing in spring serves as well, and saves some after-tillage, which the more consolidated early ploughed land would require; and moreover, the early ploughing is thickly covered by spring with young clover, all of which is killed by the first tillage. Later ploughing would cause much less seed to germinate, and be therefore destroyed.

The Eastern Shore bean grows very kindly on these lands, after marling, and instead of being prized as an improver, is denounced by Dr. Braxton as a worthless weed, obstructing the growth and lessening the product of clover, the great green crop for manure, which he values far beyond all others as an improver.

Dr. Braxton esteems the ruta baga turnip crop very highly, and deems the sugar beet as comparatively worth very little. Besides the value of the ruta baga crop, for stock, when secured, he thinks its product almost certain, on his land, with proper management.

When on his farm in November, 1840, I saw a

novel mode of following ruta baga by wheat, or rather having both crops growing at once. On a rich part of the clover land fallowed for wheat, ruta baga was planted in rows 4 feet apart, and cultivated by ploughing and weeding. In October, when a fine growth of turnips was on this patch, (though no manure had been applied, except the green clover turned under,) wheat was sown here at the same time with the adjoining part of the field, and the seed ploughed in, between the ruta baga rows. The roots were afterwards taken up, when grown and required for consumption. Dr. Braxton left home before the wheat was reaped; but from its previous appearance, as well as his overseer's report, he thought the product not much lessened by the growth of turnips.

OBSERVATIONS AND ROUGH EXPERIMENTS. 1841.

For the Farmers' Register.

1. *Gypsum.* On March 26th, 21 bushels of pulverized gypsum (French) sown at the rate of a bushel per acre on clover of second year's growth. Soil, originally acid and very poor; a light loam on sandy subsoil, well marled in 1824, since manured, and altogether improved, from a product of 6 bushels of corn per acre to 25 or 30. The clover crop mean, and after June 1st, freely grazed. No benefit whatever perceived on a comparison with the adjoining clover not dressed with gypsum on a soil exactly similar.

2. *Green-sand.* At the same time, in the same field, on similar soil, and on clover of same growth, one acre dressed with 40 bushels of green-sand earth (not calcareous,) from James river. No effect produced.

3. In March, eight acres of good loam, marled 10 years ago, product in corn supposed equal to 30 bushels, and in wheat after clover 18 or 20 bushels, were dressed with green-sand earth at the same rate. Two beds left out. Clover in its first year. No perceptible benefit.

4. *Seed wheat.* Having seen *old* seed wheat recommended, by several contributors to the Register, of the crop of 1840, the grain of which was very good, a small quantity was kept in good order and carefully guarded against all danger of heating, or other injury. This fall, 12 bushels sown in a field of uniform and good quality, and immediately adjoining *new* seed of same kind (purple straw.) The sowing of both kinds commenced and finished in the same day, and operations in every respect conducted exactly alike. Quantity to the acre the same (5½ pecks.) The old seed *a little* weevil-eaten, notwithstanding every care used in keeping it, but not enough so to be much objectionable. The old seed longer germinating, and to this day, December 31st, looks decidedly inferior to the wheat from new seed.

5. *Top-dressing with farm yard manure, and with unprepared leaves.* Eighteen acres of light sandy loam in clover of 2d year, very thin and very unpromising, was top-dressed in April, 1840, with rough and unrotted manure from the farm-pen, at the rate of 800 to 1000 bushels per acre. This land was marled in 1821, and though greatly improved, (for before its product was 8 to 10 bushels in corn, and perhaps 3 in wheat,) was still but of middling product, and before this manuring, would not have brought more than 18 or at most 20 bushels of corn per acre, or 6 bushels of wheat after corn. The last crop of wheat, cut in 1839, after corn, was known to be only 42 bushels of wheat or 2⅓ bushels to the acre. That crop however was very much damaged by chinch bug. The top-dressing was as coarse as any trodden litter could be, many corn-stalks merely mashed, but unbroken, constituted an average of the manure of the farm-pen, which was made of the stalks and straw of the farm-pen trampled by the cattle, and covered over with the manure of the stables and hog-pens every time they were cleaned out throughout the winter, which was about once a week. The hog-pens were principally littered with leaves from the woods. The effect of the top-dressing on the clover was almost immediately perceptible. In September the field was fallowed for wheat, and in June of this year 283 bushels of wheat were cut from it, equal to 16 bushels per acre. The soil is decidedly a corn soil, and too light for wheat. But the most striking and gratifying proof of improvement is the frequent appearance of green-sward in many places, where it was not at all observed prior to this manuring. This valuable grass has generally made its appearance in spots in the different fields after marling, but this particular field was too poor for its growth (so as to be noticed) even after marling, until it received this top-dressing.

6. In January, 1840, about 15 acres of light loam, with sandy subsoil, in clover of second year's growth, top-dressed with 377 very large ox-cart loads of leaves, principally pine-beards raked together in adjoining woods. The covering was so thick that at one time it was thought that the clover was in great danger of being smothered. It however came through and was decidedly benefited, except in spots where the leaves were left too thick. In the fall, the whole was fallowed for wheat. Crop 15 bushels per acre, and considered a good yield for the land. Its product after corn has usually been about 8. Part of this land was much infested with wire-grass. In getting in the wheat no means adopted to get rid of wire-grass, except to pick up and carry off the little that the harrows brought to the surface. And in fact this piece received one harrowing less than I usually gave to such wire-grass spots, on account of a rain which interrupted the operations. This fall, 1841, in ploughing for corn, noticed that very little wire-grass was left. Could the leaves have had any agency in killing the wire-grass, by shading or otherwise? Or did the mere exposure of the roots to the sun, as some maintain, effect it? Some credit is no doubt due to the latter cause, but the former has a strong, and, may be, a stronger claim; for, in similar spots, fallowed without any application of leaves, I have never known a similar decrease of wire-grass. It may be well to mention that the above 15 acres were 10 or 12 years ago well marled—the soil, originally and previously to marling, acid.

7. *Leaves ploughed under.*—In January, 1841, covered a stiff, intractable soil, previously and some years ago well marled, with leaves, which were ploughed under, and oats sown early in

March. No benefit to the oats whatever; and when ploughing the land for wheat this fall, the leaves were turned up very little decayed.

E. RUFFIN, JR.

[The foregoing statements were furnished upon our suggestion, and in regard to most of them in consequence of our seeing or otherwise knowing the general results, and deeming them the more worth notice, because of our personal acquaintance with the original condition and character of the land, which was the subject of our own early labors and improvement by marling. Though the written memoranda of the writer furnished the by-gone but recent facts nearly as here stated, still, as *accurate experimenting* had not been at first designed, and still less any publication of results, it is not pretended that the statements of quantities are entitled to the respect due to the results of carefully and properly conducted experiments.

We have another and more general reason for presenting these notes of observation to our readers. It is to show that by merely noting down, in the most concise and simple form, any results or facts observed deemed worth remembering, any practical cultivator might aid in furnishing a mass of interesting facts, or suggestions of subjects for inquiry and more careful experiment. There are hundreds of our readers, who never report any thing for publication, who might in any half hour, furnish some few such observations, which, *as facts*, and still more as having the authority of the name of the observer, would attract general attention, and convey much of useful suggestion, and induce imitation and co-operation in the pursuit of doubtful truths—all tending to cause the making of properly conducted and accurately reported experiments. Will each one reader, who may acknowledge the value of such operation and results, do something towards producing them?—ED. F. R.]

For the Farmers' Register.

LIQUID MANURE.

In the December number of the Register, I notice detailed a number of interesting and conclusive experiments, make by Mr. Milburn of Yorkshire, in the application of liquid manure. In the fall of 1840, after cleaning out my standing farm-pen for the winter reception of my cattle, there was left in it a quantity of dark rich liquid, which I felt inclined to apply to a neighboring field, then in young clover of first year's growth. With much the same primitive contrivance of pails and barrels placed in tumbril carts, as used by Mr. Milburn, I contrived, with much inconvenience, to get out most of the liquid. It was spread very unequally, and I cannot say at what rate. In many spots where the application was too heavy the clover was killed outright, but was succeeded the next spring by a most luxuriant growth of weeds. Generally, however, the clover was much benefited. This fall the field was fallowed, and sown in wheat. On the part where the liquid manure was applied the wheat now exhibits a decided superiority. I have no sort of doubt of the highly enriching quality of the liquid, and of the great annual loss suffered by our farmers when it is allowed to run off into the nearest gullies, or carefully drained off to the adjacent ravines, in order to render the working of the manure more comfortable to the hands. In every properly shaped farm-pen, each spring and fall, when it is cleaned out, there will always be found a large quantity of this valuable liquid, which can be easily carried out by the simple contrivance recommended by Mr. Milburn. I think this single article, above referred to, is worth to every reader of the Register, who will adopt and act on its suggestions, more than the subscription to its whole series. Z.

Jan. 6, 1842.

ON SOILS.

From the American Farmer.

Mr. Editor:—Will you accept of a few hasty and indigested remarks on soils and their properties of production? Such as they are, they will be very much at your service; but I must claim for them the indulgence of yourself and readers, as they are written *currente calamo*, and without being transcribed or copied.

In the American Farmer, No. 38, of the current volume, I observe that you have copied a short article from the Encyclopedia Britannica, concerning a very fruitful soil in the county of Caithness.—Such soils have been found, in the alluvial formation, in different parts of the globe—such is that of Ormiston, in East Lothian; such is that of Somersetshire, in the low lands, near the opening of the river Parret into the British Channel; some of the lands of East Florida, possess the same properties; and to come nearer home, some of the land of Spesutia Island, in Harford county, possesses the same inherent quality of production.

Now as to the theory, by which this extraordinary fertility is explained, in order to form a rational and correct one, we must take into view all the connecting circumstances. The soil described by the writer of the article under consideration, is said to consist almost entirely of broken shells and fine mould, the latter in almost an imperceptible proportion—that from Ormiston afforded, by analysis, eleven parts in the hundred of mild calcareous earth, twenty-five of siliceous sand, forty-five of finely divided clay, nine of animal and vegetable matter, and a small quantity of phosphate of lime, to which latter its fertility is in a great measure attributed.

The soil from the low lands of Somersetshire has been found to consist of only one ninth of siliceous sand, and *eight ninths of calcareous marl*, with five parts in the hundred of vegetable matter; *and its fertility is attributed to its power of attracting principles of vegetable nourishment from the atmosphere, and from water.*

Much of the secret of fertility of soils consists in their power of attraction, &c., as observed in the foregoing paragraph. All soils are not capable of being rendered thus *artificially* fertile—much will depend on location, whether level or undulating—much on the structure of the sub-soil and its capacity of retaining moisture; and where there is not an approximation to correct proportions, essential to fertility, the labor and expense of rendering them fertile would not be counterbalanced by their productiveness.

The attractive or absorbent property of soils has probably not been sufficiently attended to—that lime, in some form, is essential to the fertility of soils, and to their power of absorbing nutriment from the atmosphere, all experience testifies; and it is that portion of the soil which, next to vegetable mould, is most subject to loss, as well by its affording an essential part of plants, as by being gradually washed away by rains, &c. In illustration of this latter process of waste, I will mention a circumstance that has lately come within my observation. Last fall, in November, I had the roof of my kitchen covered with a thick wash of lime. A north-east storm came on before it got dry, and washed a considerable portion of it off. A window was so situated as that the droppings from the eaves were driven against it—these droppings held the lime in solution, which was beautifully crystallized on the glass—this may serve to show that the calcareous part of soils is gradually wasting. Nearly all grains contain a portion of lime, some a large portion; and they can obtain it in no other way than from the soil.

From the foregoing observations it must be apparent, that in such cases where the soil does not originally contain a large portion of lime, it will be proper, occasionally, to renew the application; and I am decidedly of opinion, that when it is intended to apply one hundred bushels to the acre it should be applied at three or four different dressings, at intervals of three or four years, as by this mode the greatest advantage will be obtained, at a given expense.

Some plants, more than others, possess the power of attracting from the atmosphere the substances essential to their growth. The houseleek, (*sempervivum,*) is a remarkable instance of a plant possessing this power—such plants, it is presumed, contain but little lime. Not only plants, but some animals of a low grade of organization, possess the power of attracting substances from the surrounding elements, essential to their growth—the oyster is an instance of this—without the power of locomotion, attached to a rock, the sperm of the oyster has the power, not only of attracting all its food from the surrounding elements, but of forming a calcareous shell for its future habitation.

But to return to a consideration of soils: it must be apparent that they should, in order to be fertile, be made to contain the food of plants, and at the same time be so constituted that they should possess the power of attracting it from the atmosphere. Many of the articles that have been found to contribute greatly to the growth of plants, cost the farmer too much, and they are of too transitory a nature. Such are *crushed bones, and poudrette*; substances, imparting astonishing fertility for one year, and where they are within a reasonable distance of transportation, will pay in one crop. It has been thought, and I should like to have the experiment fairly made, that ground oyster shells would answer nearly the same purpose of ground bones—oyster shells, though affording pure lime by calcination, differ, essentially in their properties from lime-stone. They are composed of a carbonate and phosphate of lime, and contain a portion of gelatine, or fibrine. It is hence concluded that while they would, when ground, act almost as quick as crushed bones, they would be more durable, at one third, perhaps one fourth the expense.

The most astonishing and negligent waste is attendant on the city of Baltimore, in permitting for years the essential material for *poudrette* go to utter waste and loss. Many thousand dollars are thus annually lost for the want of knowledge and enterprise. No speculation that could be entered upon at this time, would be so sure to reward its undertakers as the manufacture of poudrette in or near the city of Baltimore! Individuals have probably been deterred from entering upon it by the elaborate descriptions that have been given of the process, and the apparently large capital necessary to carry it on, whereas nothing can be more simple than the process, and no business so sure of extensive profits that could be conducted at so small an expense. It is to be hoped that some enterprising agriculturist will take the hint and make a princely fortune by it.

From the great difference of the causes that influence the productiveness of lands, it is obvious that all the favorable circumstances are rarely found to be united in any soil; but by a due attention to the component parts of soils, by chemical tests, by careful observation and experiment, we may generally be enabled by adding such parts as are deficient, to give fertility to those that are naturally sterile. It is to the earthy parts of a soil that we are to turn our first attention, and when these are formed in due proportions, its fertility may be considered as permanently established. The animal and vegetable portions are but temporary, and are exhausted by a given number of crops. Those soils must be considered best which contain the greatest store of those principles that constitute the food of plants, permanently inherent in their quality—Calcareous soils, by their constant attraction for carbon are of this class; and if they at the same time contain animal and vegetable substances, are more eminently qualified for this purpose by the supply of carbon and hydrogen which they afford. H.

Wood Lawn, February 14, 1842.

REMARKS ON A PRECEDING COMMUNICATION ON BERKSHIRE HOGS.

We are so well pleased to have so judicious and practical a farmer as the Rev. J. H. Turner, for the first time a contributor to the Farmers' Register over his own signature, that we have no inclination to find fault with any thing he says, or to defend our editorial course from his strictures. But respect for himself forbids our passing over his remarks in silence.

If it were not that our intelligent and highly esteemed correspondent had so much mistaken our remarks, at page 17 of this volume, we should deem it sufficient to refer to those remarks for our defence against his charges. It is strange indeed that we may not dare to denounce humbuggery, even where every intelligent and candid observer will admit it exists, without being deemed an opposer and enemy of the really valuable improvement on which the humbug is built. We have repeatedly, and especially in our remarks in question, admitted our belief in the Berkshire hog being a valuable breed, and of course its introduction and diffusion being an important benefit to agriculture; and so far as our interest is now connected with practical agriculture, we have acted on that belief, by beginning to raise Berkshires, though thereby supplanting another previously very highly prized breed. Nevertheless, this favorable opinion is not incompatible with another, to wit, that this breed of hogs has been praised and puffed much more than it deserves, and to subserve the self-interested views of salesmen; that there has been a deal of puffing, falsehood, and deception, for this same end, and that too practised by some of the most noted breeders and salesmen; and, in short, that there has been so much humbuggery practised in this respect, by those salesmen, that they, while filling their pockets at the expense of their dupes, have almost stifled the truth, and hid the real value of the breed, by the overlayings of falsehood. We know how much mankind dislike to be made to know that they are cheated; and that he who cheats them will always fare better in their opinion than he who endeavors to expose the cheat. But while we expect, and are resigned to the fate of getting "more kicks than coppers," or more curses than thanks, for our attempts to expose humbug, it is inconceivable to us how such a man as Mr. Turner can so far misconstrue our course and its object, and consider us as opposing true improvements of stock, or improvements of any branch of agriculture, because we oppose, and try (vainly) to expose, those who are perpetually using such real or alleged improvements to make dupes, and obtain ill-gotten gain for themselves. When we have to seek for the true benefactors of agriculture, it will not be among the Bements and the Lossings, any more than the Thorburns, the Physicks, the Princes and the Morrises.

Absence from home, when the letter of Mr. Turner was put in type, prevented these remarks being placed at the close of his communication, as would have been more appropriate.—Ed. F. R.

THE ADAPTATION OF PARTICULAR WHEATS TO PARTICULAR LOCALITIES.—PATENT MACHINES.

For the Farmers' Register.

In a late number of the Register, Mr. Carter suggested the benefit to be derived from the change of seed wheat. On a former occasion, I endeavored to draw attention to this subject, and finding that it has now attracted some notice, I shall give an account of the wheat most successfully grown here. From my early recollection till the year 1798, when the Hessian fly first made its appearance in this district of country, the white Washington was the general crop. Its destructive ravages induced many farmers to try other varieties; but it was soon found that this pestilent insect made little distinction. The late Col. Edward Hays, of Talbot, who was much devoted to agriculture, and fond of experiments, for some years abandoned the growth of Washington wheat: he afterwards got seed of me; and said, at a later period, he had tried many varieties, but had found none so valuable, and productive, as the Washington wheat. The grain is white, and makes the best family flour; the straw is soft, and both horses and cattle prefer it to any other wheat straw. It only grows well in salt-water districts. If carried into the interior it degenerates, loses its color, and becomes chaffy. For the last fifty years to which my recollection runs, this has been the principal crop on the farm where I now reside, till last year. About six years ago, supposing that changing seed with a neighbor might be beneficial, I got a few bushels of the same sort of wheat. Though he was ignorant of it, his wheat contained a small portion of smut, which soon infected all my white wheats; and after some fruitless attempts to clean it, I was under the necessity of abandoning its growth. Some of my neighbors, who have suffered in the same way, are now raising seed picked by hand, and as soon as I get pure seed, I shall sow it again. I have supposed this wheat would suit on some of the salt-water districts in Virginia. About thirty years ago, a wheat was introduced here, and is known by the name of the red chaff beard, I apprehend the same mentioned by Mr. Carter. It seems adapted to a variety of soils, and is more generally grown in this county than any other. It ripens early, though sown late; and suffers less by the frost, especially on low, wet grounds. For these properties, it has been part of my crop for many years, though it sells at a much inferior price in the Baltimore market. When my white wheat was infected with smut, though this was thrashed by the same machine, cleaned with the same fan, and stored in the same granary, it did not contract the disease. An experienced farmer, to whom I mentioned this circumstance, informed me that his white and red wheat had been equally infected.

A farmer always incurs risk by changing seed. When I abandoned the growth of Washington wheat, I purchased white flint from a gentleman in the neighborhood, who got the seed from New York in 1836, and had grown it exclusively on his farm. He had no suspicion of smut; but upon careful examination, I found it to contain a small portion, and declined sowing it. I then procured Pennsylvania white wheat, which has been lately

introduced here: it does not ripen early, and I do not think produces equal to the Washington, or red chaff.

I last summer saw some Chester county farmers in Washington, who stated that they grew there a wheat which they called the Mediterranean, which, though sown the last of August, would resist the Hessian fly. Dr. Darlington, a gentleman of science and intelligence of West Chester, confirmed their statement; and I purchased a few bushels, which I have sown for experiment. I have also sown a small quantity of white wheat which I procured from Owego county. It has a fine white grain, and much resembles our Washington white wheat.

From reading, and not from experience, I have been induced to think, that the change of seed wheat is beneficial. The Scotch farmers often import seed from England, and Scotchmen generally understand their business. I cannot undertake to say that the white Washington or red chaff beard has degenerated on my lands; on the contrary, when the season is favorable, I have found them equal in weight and product to what they were in my earliest recollection. My theory is, that there are certain soils to which particular varieties of wheat are best adapted, and when this is ascertained, it is always safest to rely on those varieties. If it be true that wheat adapted to a soil degenerates from long sowing the same seed, raised from the same ground, I should prefer the same variety from a remote place. I have seen some beautiful parcels of wheat brought into this neighborhood, which very soon degenerated. Some years ago, Judge Thomas Buchanan sent me, from the highlands of Washington county, some beautiful white wheat, from which I had formed high expectations; but it very soon degenerated, which I attributed to its not being suited to this soil. Upon the second introduction of red wheat, after Mr. Carter had ceased to sow it for fifteen years, he found it to produce well; and when the product first diminished, it is probable if he had gotten seed of the same variety from a distance, he would have derived the same benefit. The adaptation of certain varieties of wheat to particular soils is proved by the Washington wheat growing in salt-water districts, and degenerating when carried into the interior. Mr. Carter illustrates the necessity of the change of seed wheat by analogy to animals. It is now generally agreed that horses, cattle, sheep and hogs degenerate from long exclusive association. If from this cause a herd of Durhams had depreciated in value, I apprehend if one of the same herd was introduced when the connexion had been long broken, the cross would be as beneficial as if made by a Devon. I am well satisfied that the white Washington and the red chaff wheat are best adapted to my lands, and though I am not sensible they have degenerated, I should be pleased to get seed of both or either from a distant region, for experiment.

The community stands much indebted to Mr. Garnett, for his persevering efforts in the cause of agriculture; and I am pleased to find that an agricultural convention has met in the city of Washington, which has framed a constitution, and organized a society; though, I much fear, it will languish for want of funds. Agriculture, though the paramount interest of the country, and extending into every section, it seems is not so connected with *the general welfare* as to be entitled to the countenance of the general government. Perhaps one of the causes is, that no demands have been made. If I was a member of this society, I would bring the subject before them at their next meeting, to see if something could not be made out of this clause of the constitution. The manufacturers, though for the most part a sectional interest, placed themselves under its fostering wings, where they would still have remained, but for the ardent and determined spirits of the south. I am not a latitudinarian in construction; but there are many problems in agriculture not solved, many discoveries not assayed, for want of means, and I think an appropriation to these objects would be more for the general welfare, than sending ships on discovery to unknown seas, even if they should be so fortunate as to find an island within the Arctic circle.

Among other new discoveries, the wheat drill was presented last year. The patentees are Pennsylvanians, from Chester county. They stated that, in their richest lands, one and a half bushel had been found sufficient seed; on my improved grounds I generally sow two to the acre. I had a few acres put in at the rate they proposed, alternating spaces, with the plough, in which I sowed two to the acre. The next harvest will test the accuracy of their statement. I kept the time of the work done by the drill, for two successive hours, and found it would plant one acre to the hour, with two men and two horses, without fatigue to either. It deposites the wheat and covers it by the same operation; and none can be found on the surface. The saving in labor and the saving of seed are no small considerations. I was much pleased with the work done by the drill. It is somewhat complicated, and I have not sufficient information in mechanics to determine on its stability, and whether it can sustain the rough usage of rough hands.

It appears to me that there is great defect in the patent law, and I think the subject not unworthy the consideration of the National Agricultural Society. The commissioner is directed to award a patent if the machine or composition of matter *be new and useful.* By examining and comparing a machine with the models in his office, he can determine if it be new; but he has not the science, experience, ability, and means of experiment, to determine on its utility; which does not depend only on its apparent fitness for the work intended to be performed, but its ability to sustain it in continued practical operation. I do not speak from any personal knowledge of the master of patents, but it would be rare to find a man possessing all the requisite qualifications. The Patent Office ought to have attached to it a scientific practical chemist, and a scientific practical mechanic, (with salaries to command the best abilities,) who should be provided with full means for experiment. In the departments under the general government, where the general welfare is concerned, no reasonable expense ought to be spared. Patent machines and patent medicines have long been a gross imposition, and must so continue, until the Patent Office shall be put under better regulations. If the wheat drill had passed through the Patent Office under the inspection of men competent to decide on its usefulness and durability, though the price is $100, I would purchase one for the next

season; for I entertain no doubt but the saving of labor and seed in two crops would clear the cost.

WM. CARMICHAEL.

Wye, Queen Ann's, Md., Feb. 17, 1842.

ADDRESS TO THE AGRICULTURAL SOCIETY OF MASON, CABELL AND KANAWHA.

By Gen. P. H. Steinbergen, President.

Gentlemen of the Agricultural Society:—Let me congratulate you that we have again assembled under the rules of our society. It affords evidence of continued zeal to the cause of our association, and furnishes at the same time an opportunity, highly pleasing, of friendly social intercourse among its members. Such meetings are well calculated to give life and animation to the prosecution of that great interest in which we are engaged. By means of premiums to successful competitors, we can tempt the spirit of rivalry, and stimulate to increased exertion.

The farmers of this nation are the sheet-anchor and support of every other great interest of society. On their broad shoulders rests the superstructure of national wealth and prosperity, and to their success or failure you may justly look, as to an unerring index, for the condition of the whole community. How important then it is to us, that we should possess the lights of experience, in order to guide our operations! How important that those operations should be conducted upon settled principles, drawn from well authenticated facts, suited to our local circumstances. I hope that several of you the past season have given your attention to this primary duty, and will report to this meeting such actual experiments as you have made, and believe conducive to our interest. If every member would pursue such a course, we could soon make a depository of useful information available alike to all.

During the last summer some facts came under my own observation, that have peculiar and appropriate relations to the condition of our country. I had always supposed that the soil of this section of the state was deficient in calcareous matter, but from some experiments lately made on my farm by Mr. Briggs, one of the assistants of Dr. Rogers the geologist of this state, he has completely satisfied me of the actual existence of lime, with various combinations, and in situations where I had never before suspected it to be. With a vial of muriatic acid in hand, we carefully examined the whole chain of rocks cropping out of the river hills bordering on the bottom; and frequently applying the acid to such rocks as he indicated, they would rapidly foam, or effervesce, showing to a certainty the actual presence of lime. In some places we found the rocks combining nearly equal parts of lime and sand; and the same vein or ledge, on pursuing it horizontally, would evidently change its character to ferruginous, indicating thereby combinations of iron.

The very best specimen of calcareous earth we found, or that I believe our country produces, is on the bosom of some of our river hills. They are those red, naked barren-looking places generally spoken of here as "*buffalo stamps.*" There is one near my house, and on it much fine, pure, limestone gravel; the red earth freely effervescing with acids, and apparently so highly calcareous as to produce no vegetation whatever.

I must believe that the discovery of this calcareous earth may be made of vast importance in the future improvement of our soil. Its application to our sandy land particularly, when in a sod of grass and previous to turning under for corn, would surely add greatly to its production. I shall, on the first proper occasion, try the effect on some of my fields, and report to you hereafter the result.

Further and more extended observations since Mr. Briggs left the neighborhood have enabled me to trace several ledges of tolerably good limestone, (combined with sand as usual), at the distance of two or three miles from the river. Finding such specimens thus located at different angles around us, I am now satisfied of the existence of sufficient calcareous matter in our soil for all the purposes of good husbandry and profitable farming.

It is the opinion of geologists, that the character of a soil is determined by the rocks that lie underneath it, the soil being formed by the disintegration or decay of those rocks. If such is the fact, water percolating through them will carry off carbonate of lime held in solution; and that same cause thus operating for ages over the rocks, must have incorporated considerable calcareous matter in the soil. You will have observed, that under those ranges of rocks so common to our creek and river hills, you see the land is very frequently as rich as our best river bottoms; and to what other cause than the one before mentioned can we attribute the fertility that is known to exist in that particular situation?

Our alluvial bottoms, formed originally by deposition from the river, and almost annually inundated, have naturally been manured by the deposite, containing more or less of every substance over which the water should happen to have passed before reaching them. In this way we can readily account for the unsurpassed fertility of the upper Kanawha bottoms. It has been the first receptacle for the wash from the limestone region above; and the component parts of the soil formed by chemical combinations of the most fertilizing of all manures.

If we are fully satisfied of only a small part of calcareous matter present, we can enrich our soil to any desirable extent by the application of vegetable substances; and in what other way can they be more readily obtained, than by sowing clover and other grasses? It will always be in your power to make a direct use of your clover sod, by turning it under, with such other materials as your care and attention may have enabled you to save for that purpose; or you may pursue with your grass the system of grazing cattle, making them the principal auxiliaries in enriching your estate.

I had a good opportunity the last summer of comparing the relative merits and advantages which different principles of farming produced in various parts of this country; and as the result of my observation has added to my previous conviction of the utility, profit and advantage arising from grazing, as well as the vast y increased

fertility and improvement of those farms on which it was judiciously practised, I will here state somewhat in detail such consequences as I observed growing out of each system.

My tour extended from the James river to the Potomac, in the Valley, and through a part of Loudoun county.

It is well known that nearly all the Valley of this state is highly calcareous, based on limestone rock cropping out in many instances so as to obstruct agricultural operations. To me, in some instances, it was matter of perfect astonishment, that with the materials of inexhaustible fertility lying in profusion around them, I observed some fields going to waste and profitless ruin, from the want of clover and other grasses sown upon them. I perceived that even there, where the land was certainly calcareous, if they failed to combine the vegetable matter, all their efforts at general improvement were given to the winds; as they had added nothing to stimulate into active use the fertilizing properties of the lime.

I saw, in various situations, huge mounds of calcareous tufa, or travertine. This is deposited from water holding carbonate of lime in solution, by means of carbonic acid. As the excess of the acid escapes, as it does generally at some fall or ripple, the lime is deposited in the form of an impure porous carbonate, frequently encrusting stones, leaves, and sometimes trees. Never, I believe, has the hand of Providence placed any other substance of such utility to agricultural purposes, more readily at the command of the farmer. It is easily calcined, and then used as lime; or may be readily ground like plaster, and applied in large quantities on clover sod previous to turning under. In no instance where it exists in such abundance could I learn that it was used for any purpose whatever.

I could wish, for the future welfare and future improvement of the spot of my nativity, that Mr. Ruffin, the editor of the Farmer's Register, would at some time extend his trips up into the Valley, and bring into active and general use this treasure, now neglected and unnoticed.

It is thus, that often the treasures of our country lie dormant and unknown, from our not having proper agricultural surveys to bring them to light, life, and usefulness.

I found on every estate, where due attention was paid to grazing, and alternating their crops, evident improvement, particularly when aided by the grazing of cattle, long considered there as almost indispensable to the perfect management of their lands. In Loudoun, through their cattle, wheat, clover, and plaster, an impulse has been given to good farming, unequalled, I believe, by any county in the state. I there saw with pleasure, lands that I well knew thirty years ago, then poor, exhausted, gullied, and worn out, now perfectly reclaimed, and covered with cattle and most luxuriant crops of grass. I was satisfied, by comparing their oldest grazing farms with those more recently converted into them, that it was to that system mainly they were indebted for their high state of fertility. The use of plaster first gave them clover, that created the necessity of buying stock to consume it; and the continued repetition of the use of both has now produced such consequences as evidently justify the wisdom of this practice. But little corn is raised; wheat and cattle are staples of the best managed farms. Their oldest pastures are now well combined with green-sward, indicating increased fertility. It enables them to compete successfully as graziers with any other part of the state, and sell annually upwards of twelve thousand cattle.

To that county I may justly appeal for full evidence of what may be realized by the use of clover and its concomitant advantages. We have seen her exhausted fields reclaimed and made productive, her people prosperous and increasing in wealth, number, and resources. Why should we not profit by her example? I have no doubt that we now possess a much finer natural soil than theirs, and containing more calcareous combinations, the converting agent of vegetable matter. Our rolling hills and alluvial bottoms present a noble field for continued improvement. They now invite the fostering care of good husbandry. Let us then take counsel from that experience of others which is before us. Let us pursue that course which will surely increase the fertility of our land, and carefully avoid such a suicidal policy as would allow any part of our land to remain uncovered with clover or other grasses.

In thus urging on you the propriety of sowing grass on all occasions as the first move in a course of regular improvements, I would remark that proper care and attention should always be given to other resources at your command as auxiliaries, to be applied when necessity and circumstances may indicate. Your cornstalks, straw, hay and barnyard manures have their appropriate place, and time of application, in a correct rotation of crops.

The weeds that annually spring up on every farm should be cut before they mature their seed. Nothing more exhausts your soil, and prevents the formation of a good sod.

I will here warn you to beware of the blue thistle and ox-eye, two of the most foul and noxious weeds I know. They have topped the Alleghany on their march to the west, and high waters in a short time will assuredly float their seed among us. Declare a war of extermination against them at sight. Care and attention given in time can prevent their spreading, and hold them in subjection; but if neglected they will take entire possession of whole fields, to the utter exclusion of every production. I have seen whole sections of the state so polluted with these weeds, as very materially to lessen the income and value of the land.

The last season has very generally proved unfavorable to the maturity of wheat. In the Valley and in Loudoun, I was informed, that the early spring gave indications of a most abundant crop. At harvest I found those promising appearances blasted, and universal destruction occasioned in that county by the rust.

Our crops this year have certainly excelled that fine wheat growing region. As I returned to the west, I observed a change commence at the North Mountain, and gradually improving to the Ohio.

Some experiments were made last year by Mr. McMullin, a member of our society, with a view of ascertaining the best period for seeding wheat. A part of his crop was sown on the first day of August, another part in September, and the balance in October. The product has

proved very different. The first sown entirely escaped the rust, the straw unusually bright and clear, the grain full and plump, equal in quality to any produced in our best seasons—second time of sowing succeeded next—and the last materially injured by rust. This trial, however, I do not believe entirely decisive, because the last peculiar season has had great influence on the final result. Further experiments ought to be made and reported. It appears to me that the time of sowing wheat should be regulated to avoid, if possible, the two greatest evils by which our crops are endangered. I mean the fly and winter killing. Very early sown wheat will get firmly rooted before winter, if it should escape the fly; on the contrary, late sown is full as liable to receive injury by freezing out.

I would look to the particular character of the soil to determine when is the correct time of seeding it, for heavy clay land is more likely to be thrown up than light sandy soil; sandy soil retaining less water. In comparing the several casualties attending our previous crop of wheat, I am induced to believe that the chances are most in favor of the early sown producing the best crop. Make your land rich, and the fly can do no injury compared to the risk you will hazard in delay, from rust and winter killing.

I expressed my sentiments so fully in my last communication on the growth and culture of the corn crop, that I will now say but little on that subject. I yet entertain the opinion that the best preparation that we can give to land, to produce the greatest yield, should be applied when it is in a grass sod, and previous to turning it over. Whatever efforts are then made to manure and enrich the soil, the benefits resulting therefrom will be immediate and direct. I consider that deep ploughing at the same time is essential, and almost of equal importance to secure a successful crop. In no other way can we guard more effectually against the withering influence of our dry seasons, than by thus creating a depth of mellow soil, which repels its effects by lessening evaporation.

The advantages resulting from the growth of the root crops are now justly appreciated by those who have given most attention to their culture. Rising in importance in every section of the country where they have been tried, they are there considered an indispensable crop to every well conducted system of husbandry. They have proved admirable food for cows. I saw in a Philadelphia paper a publication, stating that the best lot of winter butter ever offered in that market was then exhibited, and had been made entirely from the sugar beet. Several members of this society have cultivated these crops with great success. To their experience I will refer you for practical information in regard to this culture.

I would again recommend enclosing your wood land, and converting it to standing pastures, by cutting off the small timber, and then thickly seeding it all with grass. My own experience convinces me of the great benefit resulting from adopting such a course. Those pastures that I have heretofore made, improve under grazing, and certainly will repay the amount of labor expended on their formation. I am so satisfied with the experiment, that I shall continue to increase them until all my hill land is converted into profitable pastures. Other opinions, in aid and in confirmation of my own judgment, will induce me to persevere until its final accomplishment. A gentleman who had carefully examined our hill land, and the grass growing on it, expressed his admiration at the prospect, and stated his firm belief of its capacity to rival Kentucky in good grazing. I have great confidence in his intelligence and opinion on that subject, as he is himself an admirable grazier, and well acquainted with Kentucky.

There is nothing that gives more security, or adds a greater ornament to a farm than good fencing, when judiciously arranged. The great convenience which we now have of getting rail timber, or other materials, for its construction, should induce every farmer to make substantial enclosures. How often have we seen ill-will created, and the peace, quiet, and harmony of neighbors disturbed, from the want of such adequate fencing as would give security to their crops. Very few can bear with much patience trespasses daily committed on their property, without complaining; and yet it most frequently happens, that they alone are in fault, through their own negligence and bad management, for all the injury that they have received. The law, as it now exists, permits stock to run at large, and it is your first duty to yourself and your neighbor, to guard against their depredations, by making such adequate fences as will secure your crops.

I have sometimes observed, that through inattention and carelessness to the duties of good farming, briers have been permitted to grow up in fence corners, and not unfrequently to extend over whole fields. Such negligent conduct is justly reprehensible; for surely if our land is of any value to us, it is worth our attention and protection. Nothing is easier to keep under, or even to extirpate entirely from a field, than briers. Sow your land thickly in grass, tread it with stock, apply the scythe when required, and avoid ploughing until you have a perfect sod. To lighten up the soil by the plough is to increase their growth. Their destruction is only effected by binding with grass.

The exhibition of yesterday has satisfied me, that increased energy and activity has been already given to the productions of the country by the operations of this society. The fine stock shown was creditable to their owners. The root, grass, and grain crops as abundant and productive as the season would justify. But it is in the department of female ingenuity and taste, that we are delighted to find the principal sources of the interest and pleasure belonging to our exhibition; and to the ladies would I award the greatest praise, justly earned by their spirited exertions. The number, beauty, variety, and superior quality of all the articles presented by them for premiums, were objects of just admiration to all who saw them. We earnestly hope that they will continue their exertions, and we well know, that when aided by the ladies, our cause will prosper

ROTATION OF CROPS.

To the Editor of the Farmers' Register.

Much has been said and written on this subject, and not without cause; for of all the matters which necessarily engage the mind of the reflecting farmer, it would be difficult to suggest one more important. Besides the editor himself, many successful farmers and able writers have expressed their views in full on this subject throughout the whole series of the Farmers' Register; for example, Messrs. Carter, Selden, Wickham, Harrison, Roy, Tabb, Braxton and many others, whose names have only to be mentioned at once to arrest attention and give weight to the views advanced by them respectively. These gentlemen live, nearly all of them, in *grain-growing* districts of old Virginia, are good agriculturists, by which I mean that they not only make good crops, but also yearly improve their lands, and yet they advocate different systems of rotation of crops, varying in the number of years through which the rotation passes from two to six. Nay more, the same gentleman has at different times on the same land advocated different systems—and still been successful. How is this? Does it prove that rotation is a matter of no importance? Not at all. It only proves that different soils and different situations require different systems—that it would be the height of folly to make all soils and all crops bend to one uniform system—and that even under a bad system, good management and good cultivation may and will produce satisfactory results. Let it be remembered however that the converse of this proposition is not always true. A good system will not always counterbalance bad cultivation and bad management. While having an eye, and a close one too, to the most important, let not the farmer neglect the many smaller matters, which in the aggregate may not the less affect immediate results.

If so much has been written and ably written too, what need of more? perhaps the reader will ask. I readily answer, because the subject is important, and every *fact*, however apparently trifling, drawn from experience, connected with it, is important, and one or two facts I wish to communicate, besides wishing to draw information and advice from others.

In determining on every system of rotation, a few important points must be looked to. Is the principal business of the farm the raising of stock or growing of grain? If the latter, is the land best adapted to the growth of wheat or corn? Is the farm level or hilly? Does the farmer enjoy great facility of getting his products to market, or the reverse? And several other leading matters which will readily suggest themselves.

It is not my object to discuss at this time the best rotation for every possible variety of soil and circumstance, but to call attention to that which I consider best adapted to a grain-growing farm, situated on tide water, adapted better to the growth of corn, but capable of producing very good clover and wheat.

Such generally is my farm, but it is necessary to state that it is very rolling, and that there are 60 acres of land very stiff and totally unfit for producing corn. In fixing on my rotation, I set apart these 60 acres to be divided into two fields to be fallowed alternately for wheat, and to be kept in wheat and clover as long as they remain clear of blue-grass and other pests. The remainder of my farm I could not so readily determine on. When I received it, it had been cultivated for some years on the four-shift system of Arator, fallowing however to a very small extent each year. The portion of the field not fallowed, by lying out so long, became excessively foul with sassafras, locust, wire-grass, and innumerable pests of the vegetable kingdom, so that preparing it for the next corn crop was an Herculean task. I soon found that would not do; that most of my yearly labor was expended in conquering a growth of pests only to be again repeated when the land came again into cultivation. But what to do? There was the rub. I knew that my land, with my indifferent management and limited means of manuring, could never stand the scourging system pursued with such eminent success on the fine wheat soils of Westover and Shirley, and under the superior management of Messrs. Selden and Carter. I could not adopt the three-field rotation of corn, wheat and clover; because my land was so hilly, that a hoe crop every third year would soon cover it with washes and gullies. Besides, I was fully convinced of the great improvement to be derived from summer-fallowing, the importance of having some work of this kind for the horses to do at this otherwise idle season, and the great advantage of having one field ready when the 10th of October (my seed-time) came. I confess that having, as I mentioned above, 30 acres to fallow each year, I was about this time much tempted to yield to the arguments of Mr. Harrison, Mr. Tabb and Mr. Roy, to whose interesting communications I would refer the reader, but was prevented by the hilliness and rolling nature of my land. I have no sort of doubt that the system which they so ably recommend is the one best adapted to most of lower Virginia, which is generally level and better fitted for corn than for wheat culture. The consideration that corn is a very certain, and wheat a very uncertain crop, deservedly had much weight.

Being driven from the three and also from the four-field rotation, I next very naturally turned my attention to a five-field system. I was the more reconciled to this, because about this time I heard that Mr. Harrison was thinking of abandoning his favorite three-field for the four-field system, and that Messrs. Selden and Carter were meditating a change from their boasted four-field rotation to one of five fields. These gentlemen are our Cokes and Blackstones, in matters of agriculture, on lower James river, and I must be excused for adducing them as *authority* so often.

A five-field system was then the thing. The best arrangement for five fields of which I had heard was that pursued successfully by Mr. Wickham, viz., corn, wheat, clover, wheat, clover. But I learned from Mr. Harrison that under this arrangement my farm would become foul—one of the principal objects I had in view in abandoning my old system (Arator's four-field.) A second objection was that the clover, on the authority of Mr. Selden, would most likely fail after the fallow crop of wheat. A third and very serious one was that if the crop of clover preceding the corn was closely grazed it would be rendering the earth close and compact, which was much to be re-

gretted for corn, and would be bringing the three grain crops and one year of grazing all in close and rapid succession. On the other hand, not to graze would be to insure a fine crop of vegetable pests; they in turn furnishing a nest to breed, and a harbor to protect, an equal number of animal ones. I shall revert to this system; it has much to recommend it. "Rivanna," a writer in the 8th volume of the Farmers' Register, considers it the beau-ideal of a system of rotation. By the way, if his eye falls on these desultory remarks, will he inform us whether his opinion is the result of actual observation and experience, or a deduction from theoretical principles? Dr. Braxton too recommends it as highly improving after several years' experience.

At this juncture there appeared in the volume of the Register for 1839, several essays (I judged) by the editor, in which he discussed the manuring and cleansing of lands by their own growth, and the application of the principles of the rotation of crops. A suggestion there met with made me hope that I could adopt the four-field and fallow rotation, with all its great benefits, without any detriment to the land; which was, that by sowing peas broadcast amongst the corn at the time of laying it by, an excellent pea fallow might be had the same fall. Such a pea crop would not only be alternating the *kinds* of crop, but would be furnishing enriching matter to the land for its improvement. I tried it; but failed so completely on the first trial that I was never after induced to repeat it. Yet such practice is highly recommended, and Mr. Braxton, in his valuable article on rotation, in vol. viii., if I mistake not, says that he has practised sowing peas in this way, and with success. I also tried sowing buckwheat in the same way, but with no better result. All would not do. To the five-field rotation I was driven. Having thus unconditionally made up my mind to adopt five fields, I was anxious to adopt the plan most improving, and which also would yield most immediate profit. I adopted a system suggested in one of the above mentioned essays, viz.:

First year, corn.
Second do. peas, fallowed in fall for wheat.
Third do. wheat.
Fourth, do. clover.
Fifth , do. wheat.

And wishing to derive every benefit, I also adopted the recommendation of sowing the corn field in rye in the fall; the rye to be turned under next spring while in flower for peas. I did not derive the slightest benefit from the rye. If the month of May happened to be dry, I found it very laborious ploughing the land in rye, even when other land did not appear very hard; and I soon became convinced that if any benefit did accrue to the land from the rye, it was not sufficient to remunerate me for expense of seed and ploughing. I have since seen, in one of Mr. Carter's papers, that he came to the same conclusion with regard to oats turned in for improvement, from an experiment actually made. I also substituted, when ill-supplied with seed-peas, buckwheat for the peas. But I never found any benefit from it. Nor ought it to have been expected. Both rye and buckwheat are narrow-leaved, fibrous-rooted, grain-producing plants, and no doubt must draw nearly as much from, as they can return to, the earth.

My rotation now stands—1st year corn, 2d peas, 3d wheat, 4th clover partially grazed, (late,) 5th wheat. About half of the corn land is put in oats and sown in clover, leaving only half for peas and wheat. That put in oats of course remains two years in clover, and, with the help of a standing pasture, supports the stock, till time to glean the wheat fields, both of which are grazed moderately. In fact I have come to the conclusion, that light or corn land, like mine, to improve *progressively*, must be grazed. There might be faster improvement, for a short time, without the hoof, but it would sooner cease to progress.

To my present plan there are strong objections, which I will briefly enumerate. 1st, the expense and labor of the additional ploughing for peas, when compared with the sowing of clover in the five-field rotation of Mr. Wickham. 2d, clover is not apt to succeed very well after the wheat on the pea fallow. Whether the peas render the land too porous, or whether the rank growth of wheat which succeeds a rank growth of peas smothers the clover, I am unable to say. A third objection is, that the oat field, being followed two years by clover, becomes very foul. And two years in clover are necessary to bring that portion into rotation with the other half of the field reserved for wheat. I select for the oats the most rolling portion of the corn field, which is thereby subjected to one ploughing less in the rotation than the remainder of the field, and if it becomes more foul, my idea was that it would be less apt to wash; and of the two, foulness or gullies, I greatly preferred the former. But even in this I have been disappointed, for by this arrangement, it will at once be seen that the land intended for oats lies throughout the winter without any vegetable cover, and of course in the worst state for the action of the rains. I believe that if I adopted the five-field system, marked below No. II, and followed the corn by wheat on all the rolling parts and by oats in all the level parts, the whole to be sown in clover and fallowed the following fall twelve months, that it would not only be better, for guarding against washing, but also it would be a more cleansing system, so far at any rate as the oat land is concerned.

I confess that I am now wavering between the two systems and have not yet come to a final determination. If any brother farmer can aid me in my quandary he will receive my warmest thanks. I cannot do with less than five fields; and the question is shall I adhere to my present five field and (pea and clover) fallow rotation, or shall I adopt Mr. Wickham's system of five-fields, two of which are in clover. To compare them better I will place them in juxtaposition.

I. Pea & clover fields.	*II. Two clover fields.*
1st year corn.	1. corn.
2d " half in peas, and half in oats.	2. half in wheat and half in oats.
3d " half in wheat & half in clover.	3. clover.
4th " clover.	4. wheat.
5th " wheat.	5. clover grazed.

I think both capital rotations, as free from objections as any rotation contained in 5 years or less time can be, but they still have their objections, some of which I have stated above with regard to each one. Here I would only ask a single question. Would as much wheat be made on the 2d as on the 1st plan? A reduction of the

profits of each to figures I am unable to give, never having tried one of them.

I am aware of a third scheme of a five-field rotation recommended and adopted by Mr. Carter. But in my humble judgment it is inferior to either of the above; and in this opinion I am supported by Mr. Braxton, and by a writer over the signature of R. in vol. viii.

In the above remarks, I have frequently called to my aid the authority of many of your ablest correspondents, and in doing so it is hoped that the opinions of none have been misrepresented. If otherwise, I hope to be set right; and cannot conclude without remarking that if this communication has no other merit, it has at least that of presenting in one view a long list of Virginia's noblest sons and benefactors. *Benefactors*, I say, for by regenerating her soil, they have done her more service, than the whole host of her politicans for the last forty years. N.

February, 1842.

ON THE FARMING OF THE REV. JESSE H. TURNER.

To the Editor of the Farmers' Register.

It is a sort of adage that there are "secrets in all professions." I believe, however, that there is an exception to this as there is to most general rules. The profession of farming is an exception. By common consent, the experience of every farmer is common property with his brother farmers, and it is generally conceded that every farmer has a right to call on others for such information as he wishes, without the fear of refusal. With these remarks I would take the liberty of making an appeal (and I hope not in vain) to my old friend, the Rev. Jesse H. Turner. In a recent visit to his farm I was delighted at the neatness, order, system and high state of fertility which he had effected in a few years. But that which most of all is to be admired and is the best test of good farming, is that he makes his farm very profitable. Now I hope Mr. Turner will excuse the call which I make upon him, and gratify me as well as do the public a service by giving a general detail of his system and management. I hope he will give us a series of essays embracing his *whole* system, rotations, corn-culture, grass-culture, manuring, fallow, &c.

W. J. Dupuy.

[We have, long ago as well as recently, made similar requests of Mr. Turner, and now heartily second this public call made on him by our correspondent. We know of no one whose practice has been more successful, or profitable, in his situation, of a farmer near enough to a city to use bought manure. Still, we think that he has so far missed one of the greatest means to aid and fix his other manurings of his fields, in neglecting to apply lime. Without this, or some other calcareous manure, on a naturally poor soil, all putrescent manures are but of transient effect, and are rapidly lost. Mr. Turner has made unquestionable and very large agricultural profits, by continually renewing large supplies of purchased putrescent manures, added to his own farm supply. But if he had made his soil calcareous, it would render the other manures permanent, and also make the crops better and more certain, than can be done by any possible amount of putrescent manure alone. While fully believing that both the enriching and the profits of Mr. Turner's farm have been very considerable and unusual, we must still also believe that there is yet wanting, in the use of lime, the "one thing needful," to render his improvements permanent, and his farming far more perfect and profitable.—Ed. F. R.]

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